

Examining the Factors Affecting Learning Engagement in Self-Directed Learning Using Mobile Technology in Higher Education

Yuzhi Lai^{1,2*}, Nan Pu¹

¹ Hefei University of Technology

² Leiden University

* yzlai@hfut.edu.cn

Abstract: In language learning, university students are increasingly adopting out-of-class self-directed learning using mobile technology. As there is no teacher involved, students' learning engagement is an essential indicator for effective and successful self-directed learning. This study examined how university students' three dimensions of learning engagement were influenced by their self-efficacy, self-regulation skills, perceived usefulness and teachers support in self-directed language learning using mobile technology. The participants included 325 language students in different disciplines attending Chinese universities. Multiple regression analysis was conducted to analyze these data. The results revealed that cognitive engagement was affected by self-regulation skills, self-efficacy and perceived usefulness. Behavioral engagement was related to teacher support and self-regulation skills. Emotional engagement was predicted by self-regulation skills, self-efficacy and perceived usefulness.

Keywords: self-directed learning, mobile technology, language learning, learning engagement, higher education

1. Introduction

Mobile technology has provided new ways for foreign language education. Characterized by its individuality, portability and social connectivity, mobile technology has made language learning adaptable, seamless, movable and collaborative (Sung et al., 2015). For example, in the United States, Duolingo, a popular mobile application focusing on foreign language learning, has been used by university students from various backgrounds to develop their Turkish language competence based on its wide range of resources and social networking features (Loewen et al., 2019). In Australia, Chinese Island (CI), an immersive 3D virtual environment, was introduced to effectively engage Chinese language learning students, facilitate their authentic language use, and enhance their learning experience (Wang et al., 2021). In China, WeChat, a multi-purpose mobile app, has been used to help students to develop their pronunciation by receiving feedback from automatic speech recognition (ASR) and/or peers (Dai & Wu, 2021). Nevertheless, research on mobile-assisted language learning (MALL) has been mostly about teacher-led language learning to date, rather than student-initiated use of mobile apps to learn outside class (An et al., 2020; Nami, 2020). In higher education, moreover, there is not much time for students to learn and master foreign languages as part of the language curriculum and, in some countries, students are not given sufficient in-class time to practice their foreign languages to ensure language acquisition (Liu, 2020; Nami, 2020; Trinder, 2017). In order to address this issue, many researchers (e.g., Lai et al., 2022a; Pramesti, 2020) have suggested that students adopt out-of-class and self-directed language learning with the assistance of mobile technology to gain more exposure to authentic foreign languages, thus further enhancing their language competence. This out-of-class and self-directed language learning using mobile technology means that learners take responsibility for and control of their own language learning process, including deciding what and how they learn with the assistance of mobile technology (Merriam & Bierema, 2013). More specifically, students utilize mobile apps such as Twitter, YouTube, Facebook, and/or foreign language-specific apps such as Duolingo and Google Translate to create their own language learning environment.

Research on self-directed language learning using mobile technology has offered insights into students' learning experiences (e.g., Lai et al., 2018), learning strategies (Lai et al., 2022b), and acceptance and adoption of the use of mobile

technology in self-directed language learning (Lai et al., 2022a). However, research focusing on learning outcome such as engagement has been limited up to now. Learning engagement is consistently identified as a key predictor of learner outcomes in online environment (Brown et al., 2022). It contributes to active involvement and persistence in the process and thus relates to successful learning performance. Researchers have valued learning engagement in the online learning environment for years (Alemayehu & Chen, 2021; Jung & Lee, 2018). Therefore, it is a priority to identify the factors that affect learners' engagement in self-directed learning, thus providing self-directed learners, facilitators and software developers with meaningful feedback to enhance the quality of learning (Heo et al., 2022).

2. Theoretical framework

Engagement in self-directed language learning using mobile technology refers to the ongoing time, effort, and energy that learners put into this form of independent learning to achieve their goals (Kuo et al., 2021; Lan & Hew, 2020). Student engagement has been conceptualized and operationalized as a multidimensional construct which can be broken down into behavioral, emotional, and cognitive engagement. Behavioral engagement means students participating in a language learning activity such as taking notes (Fredricks et al., 2004). Emotional engagement refers to students' affective reactions toward their learning experience (Kuo et al., 2021). These emotional feelings include enthusiasm, enjoyment, interest, fun, boredom, and feelings of depression (Deng et al., 2020). Cognitive engagement means that learners put effort into understanding and mastering the language knowledge and skills (Skinner et al., 2008). Learners' and teachers' perspectives are employed in this study to explore the factors that affect self-directed learners' engagement in the out-of-class learning context.

Factors from learners' perspective includes self-regulation skills, self-efficacy and perceived usefulness. Self-regulation skills are defined as the ability of individuals to actively regulate their own learning tasks or behaviors from metacognitive, motivational, and behavioral perspective (Zimmerman, 1989). Self-efficacy defines learners' self-perceived capability to master the functions of mobile technology and systems and to learn well using the mobile technology. Perceived usefulness reflects learners' perceptions of the advantages of mobile technology (Lin et al., 2016). In addition, the factor from teachers' perspective is teacher support. Teacher support refers to the facilitating support that teachers can provide to self-directed learners with the aim of enhancing their learning experience. According to Garrison and Cleveland-Innes (2005), interactions between teachers and learners influence learners' engagement more strongly than interactions between learners in online learning. Similarly, in the context of mobile-assisted self-directed language learning, teachers are considered to play a critical role (Lai, 2015; Lai et al., 2022b). Unfortunately, research has found that teachers tend to perceive themselves as having a limited influence on students' autonomous learning outside the classroom (Chan, 2003; Toffoli & Sockett, 2015). Thus, teachers' roles should be considered and empirically examined in the discussion of learners' autonomous learning behaviors outside the classroom (Lai, 2015).

Overall, this study aimed to investigate how cognitive, behavioral and emotional engagement are related to learners' factors (self-regulation skills, perceived usefulness, and self-efficacy), and teacher factors (teacher support) in self-directed language learning using mobile technology. The findings may provide implications to make self-directed learners more engaged, further achieving effective and successful autonomous language learning with technology.

3. Method

3.1. Participants and procedure

A total of 446 self-directed English language learners were recruited, forming a volunteer multidisciplinary sample from Chinese universities. We selected the eligible students by their answer to the first item at the beginning of the questionnaire ("Have you ever chosen to learn English language by yourself?"). We chose the convenience sampling method with an online questionnaire to obtain the data. To recruit as many participants as possible, we distributed a hyperlink of the online questionnaire from Qualtrics via social media platforms. The purpose of the anonymous link was to encourage participants to express their preferences honestly and openly. Participants were informed of the objectives

of the questionnaire and how these data would be used and were asked to give their consent at the end of the questionnaire. Completing the survey took participants around 5-10 minutes. Research clearance was obtained from the ethics committee of the ICLON Research Ethics Committee.

3.2. Instruments

The questionnaire items related to (1) social-demographic questions such as gender, educational level, discipline, and the English exams that they had passed; (2) scales about self-regulation skills, self-efficacy, perceived usefulness, teacher support, cognitive engagement, behavioral engagement and emotional engagement in self-directed language learning using mobile technology. The items were measured on a five-point Likert scale where “1” represented “strongly disagree” and “5” indicated “totally agree”. All the instruments used in this study came from existing validated scales. To fit our research context, we added a contextual description “When self-studying English language...” to define the context-specific feature. To ensure face validity, the questionnaire was sent to two academic professors and ten university students for internal review. Based on their feedback and suggestions, we modified the wordings to prevent semantic bias.

3.3. Data analysis

To answer the research questions, IBM SPSS 25 is utilized as the statistical tool for data analysis. The multiple regression analysis will be employed to examine how teacher support, learners’ self-regulation skills, perceived usefulness, and self-efficacy are related to three dimensions of learning engagement in self-directed learning using mobile technology.

4. Result and discussion

4.1. Descriptive statistics

The data in this study were collected from August to November 2021. A total of 446 respondents visited the questionnaire website and 352 respondents successfully completed the questionnaire (completion rate was 78.9%). Among the completed questionnaires, there were 28 respondents who stated that they had no experience of self-directed English learning; that left a total of 325 observations making up the study. Of these, female participants accounted for 52%, and male participants represented 48%. Other demographic information is shown in Table 1.

Regarding the activities that they participated in (see Table 2), over 60% of participants used mobile technology to listen to/watch foreign radios/videos, look up and recite vocabulary through mobile apps like Youdao Dictionary, Baicizhan, and search for information through websites or apps. In addition, in the option of “Others”, several participants indicated that they did English tests, watched online English courses, played English games, and listened to English songs. Table 3 shows the mean scores of each scale, standard deviations, number of items in each scale and their ranges, and Cronbach’s coefficient alphas. Correlations between these variables are shown in Table 4.

Table 1.*Frequency and percentage of participants by gender, education, and major.*

Demographic factors	<i>n</i>	%
<i>Gender</i>		
Male	156	48
Female	169	52
<i>Education</i>		
Undergraduate	249	76.62
Postgraduate	76	23.38
<i>Major</i>		
Language	108	33.23
Non-language	217	66.77
<i>Language proficiency</i>		
Low level	121	37.23
High level	204	62.77

Table 2.*Activities that students participated in.*

Activities	Frequency	Percentage (%)
Listen to/watch foreign radios/videos	251	77.23
Communicate with native speakers or peers online	116	35.69
Read online newspapers	160	49.23
Search for information through websites or apps (like Baidu, Zhihu)	213	65.54
Look up and recite vocabulary (like Youdao Dictionary, Baicizhan)	246	75.69
Using language-specific learning apps (Like Qubeiyin, , etc.)	109	33.54
Others	6	1.85

Table 3.*Mean, standard deviation, and reliability information of each scale.*

Scales	Items	Range	M	SD	α
SDL	5	1-5	3.7754	.77117	.865
SE	7	1-5	4.3754	.62894	.931
OP	7	1-5	4.0677	.63675	.855
TS	6	1-5	3.8841	.77096	.888
BE	3	1-5	3.8728	.75647	.692
CE	3	1-5	4.1959	.62929	.773
EE	3	1-5	4.0328	.66276	.783

Table 4.*Correlations between variables.*

	SDL	TS	SE	OP	BE	CE	EE
SDL	1						
TS	.538**	1					
SE	.367**	.384**	1				
OP	.610**	.468**	.639**	1			
BE	.624**	.509**	.331**	.470**	1		
CE	.479**	.381**	.602**	.586**	.578**	1	
EE	.500**	.398**	.460**	.523**	.515**	.643**	1

4.2. The differences between majors

Independent sample t-test was used to examine whether students with different genders, educational levels, majors and language proficiency differed in their three dimensions of learning engagement, self-regulation skills, perceived usefulness, and self-efficacy, the teacher support they received in the process of self-directed language learning using mobile technology. The results showed only students with different majors had a statistical difference on behavioral engagement ($t = 4.554$, $p < 0.001$), emotional engagement ($t = 2.045$, $p < 0.05$), self-regulation skills ($t = 4.371$, $p < 0.01$), teacher support ($t = 4.960$, $p < 0.01$), and self-efficacy ($t = -2.944$, $p < 0.01$), not on cognitive engagement and perceived usefulness.

4.3. The effect of learners' and teacher's factors on three dimensions of learning engagement

Multiple regression analysis was performed to determine whether learners' and teacher's variables predict learners' cognitive, behavioral and emotional engagement. In terms of cognitive engagement, the regression results indicate that the overall model with the four independent variables significantly predicts learners' cognitive engagement, $R^2 = .459$, $R^2_{adj} = .452$, $F = 67.814$, $p < .000$. This model accounts for 45.9% of the variance in cognitive engagement. After reviewing the beta weights, it was determined that only self-regulation skills, self-efficacy and perceived usefulness significantly contributed to this model. Teacher support was not a significant predictor ($p > .05$) in the model, as shown in Table 5.

Table 5.*Coefficients estimates of the model with four predictors and cognitive engagement as an outcome variable.*

Variables	B	SE	Beta	t	Sig.	R ²	Adj.R ²	F
1(constant)	.976	.200		4.878	.000			
TS	.025	.041	.031	.608	.544			
SDL	.160	.046	.195	3.499	.001			
SE	.387	.054	.387	7.155	.000			
OP	.203	.062	.205	3.252	.001	.459	.452	67.814***

Regarding behavioral engagement, the regression results indicate that the overall model with the four independent variables significantly predicts learners' behavioral engagement, $R^2 = .438$, $R^2_{adj} = .431$, $F = 62.253$, $p < .000$. This model accounts for 43.8% of the variance in behavioral engagement. After reviewing the beta weights, it was determined that self-regulation skills and teacher support significantly contributed to this model. Self-efficacy and perceived usefulness were not significant predictors ($p > .05$) in the model, as shown in Table 6.

Table 6.

Coefficients estimates of the model with four predictors and behavioral engagement as an outcome variable.

Variables	B	SE	Beta	t	Sig.	R ²	Adj.R ²	F
1(constant)	.838	.245		3.415	.001			
TS	.217	.050	.221	4.301	.000			
SDL	.441	.056	.449	7.888	.000			
SE	.044	.066	.037	.665	.507			
OP	.083	.076	.070	1.082	.280	.438	.431	62.253***

Concerning emotional engagement, the regression results indicate that the overall model with the four independent variables significantly predicts learners' emotional engagement, $R^2 = .360$, $R^2_{adj} = .352$, $F = 45.076$, $p < .000$. This model accounts for 36.0% of the variance in emotional engagement. After reviewing the beta weights, it was determined that self-regulation skills, self-efficacy and perceived usefulness significantly contributed to this model. Teacher support was not a significant predictor ($p > .05$) in the model, as shown in Table 7.

Table 7.

Coefficients estimates of the model with four predictors and emotional engagement as an outcome variable.

Variables	B	SE	Beta	t	Sig.	R ²	Adj.R ²	F
1(constant)	1.127	.229		4.916	.000			
TS	.077	.047	.089	1.630	.104			
SDL	.222	.052	.259	4.262	.000			
SE	.220	.062	.209	3.547	.000			
OP	.198	.071	.190	2.774	.006	.360	.352	45.076***

5. Conclusion and significance

This study identified the impact of learners' self-regulation skills, self-efficacy, perceived usefulness, and teacher support on three dimensions of learning engagement. Learners' self-regulation skills were found to be significantly related to all three dimensions of learning engagement. Self-efficacy and perceived usefulness were significantly associated with cognitive and emotional engagement, but not behavioral engagement. Teacher support made a significant contribution only to behavioral engagement, not cognitive and emotional engagement.

Both theoretical and practical implications are presented. As a contribution to theory, the study proposed and verified a conceptual model of learners' engagement from previous studies in the context of self-directed learning using technology. The comprehensive model offers a better understanding of the mechanism of how learners-related and teacher-related factors influence learners' three dimensions of engagement. In practical terms, considering the critical impact of self-regulation skills on all three dimensions of learning engagement, it is a priority to improve learners' self-regulation skills before starting a self-directed learning process. Although support from teachers was only related to behavioral engagement, teachers' awareness and roles of supporting self-directed learners still need to be raised.

Funding

This work was supported by Humanities and Social Science Fund of Ministry of Education of China [grant number 25YJC880038] and the Fundamental Research Funds for the Central Universities.

References

- Alemayehu, L., & Chen, H.-L. (2021). The influence of motivation on learning engagement: the mediating role of learning self-efficacy and self-monitoring in online learning environments. *Interactive Learning Environments*, 1–14. <https://doi.org/10.1080/10494820.2021.1977962>
- An, Z., Wang, C., Li, S., Gan, Z., & Li, H. (2020). Technology-assisted self-regulated English language learning: Associations with English language self-efficacy, English enjoyment, and learning outcomes. *Frontiers in Psychology*, 11, 558466–558466. <https://doi.org/10.3389/fpsyg.2020.558466>
- Brown, A., Lawrence, J., Basson, M., & Redmond, P. (2022). A conceptual framework to enhance student online learning and engagement in higher education. *Higher Education Research & Development*, 41(2), 284–299.
- Chan, V. (2003). Autonomous language learning: The teachers' perspectives. *Teaching in Higher Education*, 8(1), 33–54. <https://doi.org/10.1080/1356251032000052311>
- Dai, Y., & Wu, Z. (2021). Mobile-assisted pronunciation learning with feedback from peers and/or automatic speech recognition: A mixed-methods study. *Computer Assisted Language Learning*, 1–24. <https://doi.org/10.1080/09588221.2021.1952272>
- Deng, R., Benckendorff, P., & Gannaway, D. (2020). Linking learner factors, teaching context, and engagement patterns with MOOC learning outcomes. *Journal of Computer Assisted Learning*, 36(5), 688–708. <https://doi.org/10.1111/jcal.12437>
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109. <https://doi.org/10.3102/00346543074001059>
- Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *The American Journal of Distance Education*, 19(3), 133–148. https://doi.org/10.1207/s15389286ajde1903_2
- Heo, H., Bonk, C. J., & Doo, M. Y. (2022). Influences of depression, self-efficacy, and resource management on learning engagement in blended learning during COVID-19. *The Internet and Higher Education*, 100856.
- Jung, Y., & Lee, J. (2018). Learning engagement and persistence in massive open online courses (MOOCs). *Computers & Education*, 122, 9–22. <https://doi.org/10.1016/j.compedu.2018.02.013>
- Kuo, T. M., Tsai, C.-C., & Wang, J.-C. (2021). Linking web-based learning self-efficacy and learning engagement in MOOCs: The role of online academic hardiness. *The Internet and Higher Education*, 51, 100819. <https://doi.org/10.1016/j.iheduc.2021.100819>
- Lan, M., & Hew, K. F. (2020). Examining learning engagement in MOOCs: A self-determination theoretical perspective using mixed method. *International Journal of Educational Technology in Higher Education*, 17(1), 1–24. <https://doi.org/10.1186/s41239-020-0179-5>
- Lai, C. (2015). Modeling teachers' influence on learners' self-directed use of technology for language learning outside the classroom. *Computers & Education*, 82, 74–83. <https://doi.org/10.1016/j.compedu.2014.11.005>
- Lai, C., Hu, X., & Lyu, B. (2018). Understanding the nature of learners' out-of-class language learning experience with technology. *Computer Assisted Language Learning*, 31(1–2), 114–143. <https://doi.org/10.1080/09588221.2017.1391293>
- Lai, Y., Saab, N., & Admiraal, W. (2022a). Learning strategies in self-directed language learning using mobile technology in higher education: A systematic scoping review. *Education and Information Technologies*, 27(6), 7749–7780. <https://doi.org/10.1007/s10639-022-10945-5>

- Lai, Y., Saab, N., & Admiraal, W. (2022b). University students' use of mobile technology in self-directed language learning: Using the integrative model of behavior prediction. *Computers & Education*, 179, 104413. <https://doi.org/10.1016/j.compedu.2021.104413>.
- Loewen, S., Crowther, D., Isbell, D. R., Kim, K. M., Maloney, J., Miller, Z. F., & Rawal, H. (2019). Mobile-assisted language learning: A Duolingo case study. *ReCALL*, 31(3), 293-311. <https://doi.org/10.1017/S0958344019000065>
- Lin, H.-H., Lin, S., Yeh, C.-H. and Wang, Y.-S. (2016), Measuring mobile learning readiness: Scale development and validation, *Internet Research*, Vol. 26 No. 1, pp. 265-287. <https://doi.org/10.1108/IntR-10-2014-0241>
- Liu, N. (2020). A study of autonomous learning model of college English based on mobile network. *Education Teaching Forum*, 28.
- Merriam, S. B., & Bierema, L. L. (2013). *Adult learning: Linking theory and practice*. John Wiley & Sons.
- Nami, F. (2020). Educational smartphone apps for language learning in higher education: Students' choices and perceptions. *Australasian Journal of Educational Technology*, 36(4), 82-95. <https://doi.org/10.14742/ajet.5350>
- Pramesti, A. S. (2020). Students' perception of the use of mobile application Duolingo for learning English. *International Journal of Scientific & Technology Research*, 9(1).
- Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*, 100(4), 765-781. <https://doi.org/10.1037/a0012840>.
- Sung, Y. T., Chang, K. E., & Yang, J. M. (2015). How effective are mobile devices for language learning? A meta-analysis. *Educational research review*, 16, 68-84.
- Toffoli, D., & Sockett, G. (2015). University teachers' perceptions of online informal learning of English (OILE). *Computer Assisted Language Learning*, 28(1), 7-21. <https://doi.org/10.1080/09588221.2013.776970>
- Trinder, R. (2017). Informal and deliberate learning with new technologies. *ELT Journal*, 71(4), 401-412. <https://doi.org/10.1093/elt/ccw117>
- Wang, Y., Grant, S., & Grist, M. (2021). Enhancing the learning of multi-level undergraduate Chinese language with a 3D immersive experience - An exploratory study. *Computer Assisted Language Learning*, 34(1-2), 114-132. <https://doi.org/10.1080/09588221.2020.1774614>
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, 81(3), 329-339. <https://doi.org/10.1037/0022-0663.81.3.329>