

Jing Li^{1*} and Thanawan Phongsatha²

gabriellework@foxmail.com *

¹Zhejiang Business College

²Graduate School of Business and Advanced Technology Management,
Assumption University of Thailand, Bangkok 10240 Thailand

*Corresponding author E-mail: gabriellework@foxmail.com

Received: April 22, 2025 **Revised:** May 27, 2025 **Accepted:** June 13, 2025

Citation reference :

Li, J., & Phongsatha, T. (2025). The effect of digital game-based learning using QUIZLET on EFL students' performance and motivation. **International Journal of Industrial Education and Technology**, 7 (1), 17-27.



ABSTRACT

This study examines the effectiveness of the digital game-based learning (DGBL) tool Quizlet in improving EFL students' learning performance, investigate its impact on learning motivation, and determines how students' motivation influences their learning outcomes while using Quizlet games. A quasi-experimental design was conducted in a Chinese higher vocational college with a sample of 67 from a population of 3,500. Throughout the 12-week experiment, the treatment group ($n = 34$) engaged with games on Quizlet, while the control group ($n = 33$) was taught using conventional methods. Quantitative data were gathered via a performance test and a 5-point Likert questionnaire measuring learning motivation. Following the use of Quizlet, the results of the independent samples t-test of the learning performance revealed significant differences in students' total scores and other skills measured ($p < .05$), except for listening ($p = .226$), following the use of Quizlet. The treatment group also reported increased learning motivation towards the use of Quizlet. Furthermore, this study proved the positive impact of learning motivation on learning performance within this DGBL context, indicated by a relatively high R^2 value of .504. These findings highlight the effectiveness and importance of DGBL in EFL learning. Future research should increase sample diversity to assess generalizability, employ a mixed approach incorporating qualitative analyses and expand beyond the focus of the ARCS Model by integrating theories like Self-Determination Theory (SDT).

Keywords: Digital game-based learning, Quizlet, EFL Learning, Learning performance, Learning motivation



I. INTRODUCTION

With the ongoing scientific and technological revolution, digital technology has become an increasingly significant driving force that is fundamentally changing and reshaping the field of education. This evolution is exemplified by the 2024 World Digital Education Conference in Shanghai, China, which highlighted how digital technologies are revolutionising traditional teaching approaches. There is no denying that the application and advancement of digital technology have opened up new possibilities for education (Xu et al., 2020, pp. 877-904).

In the realm of English as a Foreign Language (EFL) learning, a variety of digital technologies and tools have been adopted to complement the learning environments, among which digital games seem to be one promising option. As a form of fun and play, digital games can powerfully engage students, and digital game-based learning (DGBL) has been identified as an approach to putting games and learning together (Prensky, 2005, pp. 97-122). References have indicated a growing trend of research interest in DGBL since 2000. Many studies have confirmed that the implementation of DGBL has the potential to enhance students' self-efficacy, learning motivation, and learning performance (Berns et al., 2016, pp. 1-23; Chen & Lin, 2016, pp. 171-186; Eltahir et al., 2021, pp. 3251-3278).

The current generation of college students has been described as "digital natives" - a term popularised by Marc Prensky (2001b, pp. 1-6). These individuals have been immersed in digital technologies since birth, interacting with countless digital devices emblematic of the modern era. Despite the widespread ownership and frequent use of smartphones among college students, these gadgets are commonly restrained in traditional classroom settings, where educators deem them disruptive to academic focus (Cárdenas-Moncada et al., 2020, pp. 64-78). Moreover, the characteristics of today's EFL students in higher vocational institutions have posed significant challenges for EFL learning. Admittedly, their overall language proficiency is inferior to that of university undergraduates. To worsen the situation, this group of students lack interest and motivation in learning English as they fail to recognise the importance of English in this highly globalised society. Therefore, they tend to be a passive audience rather than active participants, showing reluctance to engage in class activities.

To address the problem, this research aims to determine the effectiveness of using the DGBL tool Quizlet in improving EFL students' learning performance, to explore the impact of implementing Quizlet on students' learning motivation and to identify the influence of students' motivation when using Quizlet games on their performance in EFL learning.

II. LITERATURE REVIEW

The term DGBL, proposed and popularised by Marc Prensky in a book by the same name Aguilera and de Roock (2022, Online), integrates serious learning with interactive entertainment to create an engaging and enjoyable educational medium. Prensky firmly believed that DGBL would be taken for granted as a way of learning for current and future generations (Prensky, 2001a, pp. 1-5). Many studies examining the impact of DGBL on learning from different perspectives, including psychology, cognition, and learning environment, have confirmed Prensky's ideas. Essentially, DGBL is regarded as a novel approach to learning that aims to reposition education in a changing environment (Pivec, 2007, pp. 387-393), which can better engage learners but



also deepen their understanding of the learning content with improved learning outcomes and positive attitudes toward its use (Chen & Lin, 2016, pp. 171-186). Within the context of EFL, recent studies have demonstrated that DGBL applications or tools are effective for second language acquisition. In a scoping review study, Hung et al. (2018, pp. 89-104) systematically analysed 50 studies from 2007 to 2016. The findings indicated that most of these studies exhibited favourable learning outcomes, with affective or psychological improvements being the most commonly observed outcomes, followed closely by gains in language proficiency. The results of a quasi-experiment conducted by Kazu and Kuvvetli (2023, pp. 13541-13567) also showed improvement in students' test scores with the help of a DGBL tool. Motivation, derived from the Latin "movere" (to move), represents the internal forces that activate and direct goal-oriented behavior. Despite varying conceptualizations across disciplines, motivation is generally understood in psychology as the process that initiates and maintains goal-directed activities, encompassing the factors that influence both an individual's objectives and their persistence in pursuing them (Keller, 2010, pp. 267-295; Ryan & Deci, 2000, pp. 54-67; Schunk et al., 2014, pp. 1-33). In learning, motivation has long been considered one of the most complex and crucial components that determine students' achievements (Cheng & Dörnyei, 2007, pp. 153-174; Guo et al., 2015, pp. 368-384; Huang et al., 2006, pp. 243-259). Li and Pan (2009, pp. 123-128) pointed out that motivation is a significant reason for students' learning performance among other influential factors. Findings of relevant research also indicated that students' motivation had a significantly positive impact on their learning performance and outcomes in a DGBL setting (Chen & Tu, 2021, pp. 1-16; Lin et al., 2017, pp. 123-127). The ARCS Model of Motivation, developed by Keller (1987, pp. 1-7), is a methodical and systematic approach to identifying and dealing with motivational issues in instructional design and teaching. The model represents the four major constructs for people to become and remain motivated: Attention, Relevance, Confidence, and Satisfaction. Attention is an element of motivation and also a prerequisite for learning. Relevance meets the personal needs or goals of the learner to create a positive attitude. Confidence helps learners believe that they will succeed, while satisfaction finally reinforces the accomplishments with rewards (Keller, 1987, pp. 1-7). Over 30 years, it has become one of the most widely adopted frameworks for studying instructional games. Researchers worldwide have incorporated it into teaching design and assessment through questionnaires, using it to assess the effectiveness of instructional intervention in sustaining or increasing learners' motivation (Guo et al., 2015, pp. 368-384; Hao & Lee, 2021, pp. 1101-1114; Huang et al., 2014, pp. 631-641).



Based on the conceptual framework, seven hypotheses were developed to achieve the research objectives.

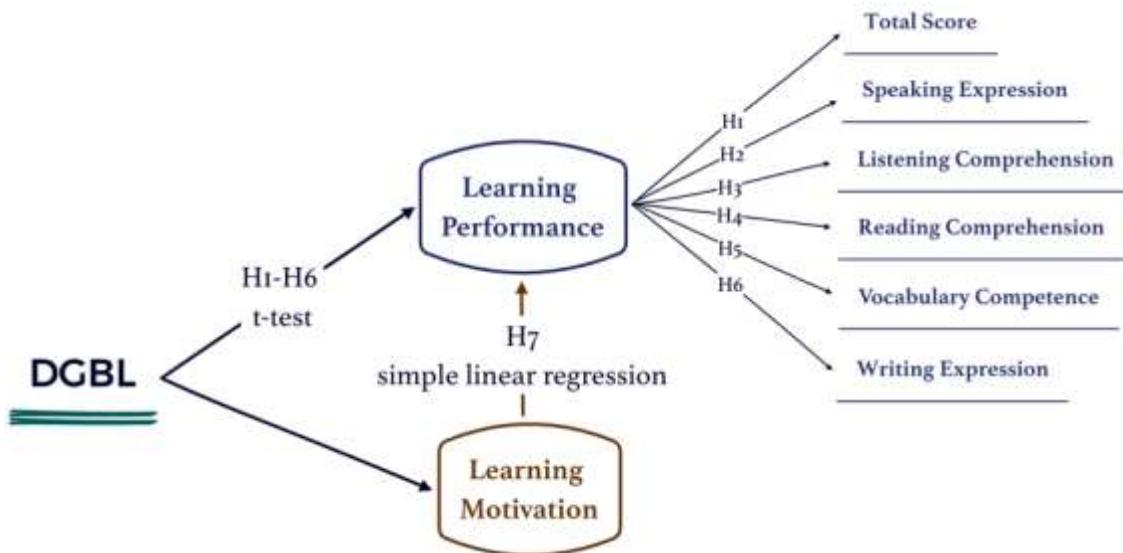


Figure 1: Conceptual framework

Hypothesis 1: The total score of students taught with Quizlet is higher than those taught traditionally.

Hypothesis 2: The speaking expression score of students taught with Quizlet is higher than those taught traditionally.

Hypothesis 3: The listening comprehension score of students taught with Quizlet is higher than those taught traditionally.

Hypothesis 4: The reading comprehension score of students taught with Quizlet is higher than those taught traditionally.

Hypothesis 5: The vocabulary competence score of students taught with Quizlet is higher than those taught traditionally.

Hypothesis 6: The writing expression score of students taught with Quizlet is higher than that of those taught traditionally.

Hypothesis 7: Students' learning motivation affects their learning performance after using Quizlet.

III. RESEARCH METHODOLOGY

Research Design

This study employed two quantitative methods to address the research questions: a quasi-experiment for 12 weeks and a 5-point Likert scale questionnaire. Quizlet was employed as the digital game-based learning tool, a versatile mobile and web-based study tool which allows users to learn through flashcards and game-based activities, including Match, Classic Live, and Blast in its latest version. Two first-year classes were selected and assigned as treatment (learning with Quizlet) and control (learning traditionally) groups, with prior academic test scores confirming comparable English proficiency. After the treatment, post-test scores



were analysed using independent samples t-tests. The questionnaire based on the ARCS Model was answered by the treatment group to measure learning motivation through descriptive statistics. A simple linear regression then examined the impact of learning motivation on performance.

Population and Sample

This study was conducted at a higher vocational college in Hangzhou, Zhejiang Province, China. The population under investigation comprised all first-year non-English majors, with a total of 3,500 students. The researchers used purposive sampling. Two freshman classes from the Sino-American Joint Program of E-commerce, rather than individual samples, were selected, as students were already assigned to classes by the institution. The sample size was 67 (control group $n = 33$; treatment group $n = 34$), which met the threshold to guarantee sufficient statistical power for the analyses. Aged from 18 to 20 years old, the participants shared similar English learning experiences, demonstrated comparable English language proficiency in High School English Proficiency Test and had a relatively high acceptance of using digital technologies in learning.

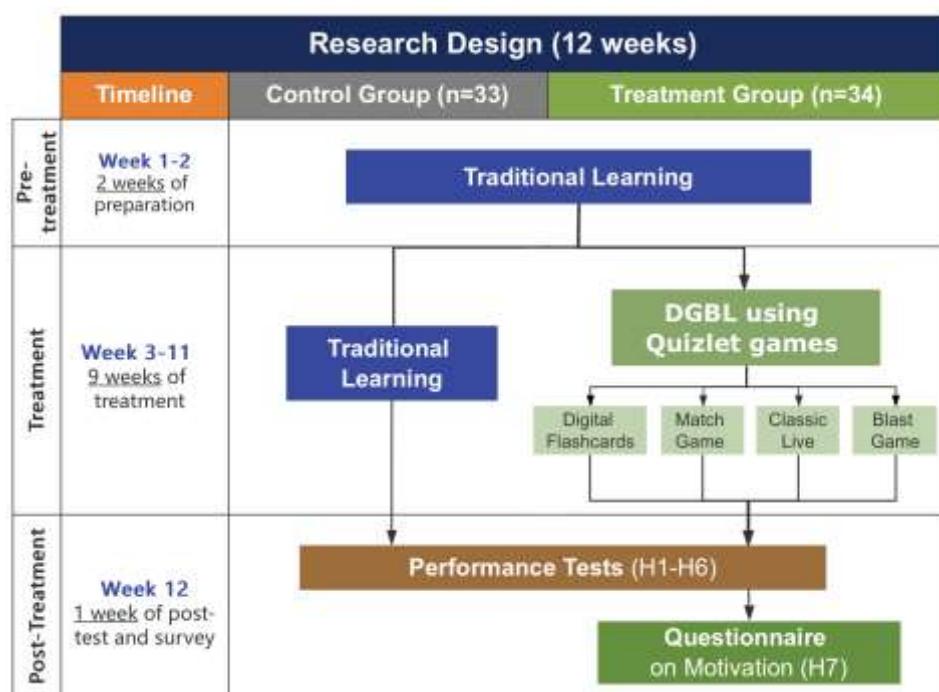


Figure 2: Research design





Figure 3: Learning plan and treatment flow

Measurement Tool

Performance tests were employed to evaluate the learning outcomes of the participants for the initial research purpose. The post-test, functioning as the course's final examination, was developed in accordance with the institution's rubrics and guided by China's Standards of English Language Ability (CSE). The performance test assessed the following variables: total score, speaking skill, listening comprehension, reading comprehension, vocabulary competence, and writing skill. The total score was measured initially to determine whether the use of Quizlet improved students' learning performance. Further research of the remaining variables was then conducted to ascertain which elements were most beneficial.

The second instrument was a 5-point Likert scale questionnaire which comprised two sections. The first part aimed to collect essential demographic information, including age and gender. The second segment focused on students' learning motivation towards the utilisation of Quizlet. With 16 items altogether, this part was adapted from the ARCS Model of Motivation by John Keller (2010, pp. 267-295) and somewhat adjusted to address the second and third research objectives. The validity was assessed by three experts based on IOC with strong agreement. A pilot study was conducted to ensure its reliability.

IV. RESULTS

Independent Samples *t*-Tests

An independent samples *t*-test was conducted to compare learning performance outcomes between the treatment and control groups. As shown in Table 1, the treatment group exhibited higher mean scores and lower standard deviations across all variables, suggesting both improved performance and greater consistency in outcomes. Statistically significant differences favoring the treatment group were found for the total score ($p = .007$, $d = .612$), speaking expression ($p = .002$, $d = .737$), reading comprehension ($p = .041$), vocabulary competence ($p = .007$), and writing expression ($p = .006$, $d = .627$), with all *p*-values falling below the .05 threshold. Effect sizes for the total score, speaking, and writing were medium (Cohen's $d > 0.5$), whereas reading comprehension and vocabulary competence showed smaller effects. These results led to the support of the research hypotheses for the five aforementioned variables. Listening comprehension proved to be the only exception, with no significant difference detected between treatment and control groups. The *p*-value of .266 exceeded the predetermined .05 significance threshold, and the effect size was small. Consequently, the hypothesis 3 was not supported, indicating comparable performance between groups in this domain.



Table 1 Comparison of Students' Learning Performance between Control and Treatment Groups

Variables	Groups	Mean	t-value	p-value	Effect Size	SD
Total Score (100%)	Treatment	81.32	5.975	2.505	.007	.612
	Control	76.23	10.199			
Speaking (15%)	Treatment	13.01	.515	3.014	.002	.737
	Control	12.5	.848			
Listening (10%)	Treatment	8.24	1.539	.627	.266	.153
	Control	7.97	1.912			
Reading (30%)	Treatment	25.82	2.329	1.786	.041	.432
	Control	24.36	4.197			
Vocabulary (30%)	Treatment	21.97	3.810	1.706	.046	.417
	Control	20.21	4.601			
Writing (15%)	Treatment	12.28	1.226	2.564	.006	.627
	Control	11.18	2.164			

Descriptives of the Questionnaire

The treatment group comprised 13 males and 21 females, with a mean age of between 18 and 20 years. Descriptive statistics were calculated for the four motivation constructs measured in this study. As shown in Table 2, all constructs demonstrated high mean scores ($m = 4.48$ to 4.61), signifying predominantly positive motivation levels across all domains. Satisfaction exhibited the highest mean score ($m = 4.61$) with the lowest standard deviation ($SD = .657$), suggesting it is the most consistently positive construct with the least variation among respondents. The overall mean score was also high ($m = 4.53$), indicating a high level of agreement.

Table 2 Students' Motivation Levels Based on Questionnaire Responses

Constructs	Mean	SD	Description
Attention	4.49	.869	Agree
Relevance	4.54	.749	Strongly Agree
Confidence	4.48	.730	Agree
Satisfaction	4.61	.657	Strongly Agree
Total	4.53	.755	Strongly Agree

Simple Linear Regression

To examine the final hypothesis, researchers performed simple linear regression with total scores of the performance test as the dependent variable and motivation scores (questionnaire total means) as a covariate. The model yielded a strong statistical significance ($p < .001$) and a coefficient of determination value of 0.504, explaining 50.4% of the variance in performance - a notably strong effect in educational technology and second language acquisition research, confirming motivation as a reliable predictor of learning performance and leading to rejection of the null hypothesis.



Table 3 Predictive Relationship Between Students' Motivation and Learning Performance

Model	R	R ²	F	p-value
1	.710	.504	32.5	< .001

V. CONCLUSION AND DISCUSSION

This study investigated the effectiveness of Quizlet as a digital game-based learning instrument in EFL instruction. The quasi-experiment design focused on three primary aspects: learning performance, student motivation, and the link between motivation and performance. The independent samples t-test results indicated substantial disparities in students' performance. All variables, except for listening comprehension, exhibited p-values below the .05 threshold, showing significant improvement in the treatment group. This suggests that students learning with Quizlet outperformed those learning via conventional methods in total score, speaking expression, reading comprehension, vocabulary competence, and writing expression. While Quizlet appears to benefit overall performance as well as most skills of EFL learning, its impact on listening comprehension may be relatively limited. The findings were consistent with the majority of studies, including those by Kazu and Kuvvetli (2023, pp. 13541-13567) and Li (2021, pp. 1-12), which also applied the DGBL approach. However, this study could not reproduce the same positive effect of Quizlet on listening comprehension as asserted in other related studies, like Dizon (2016, pp. 40-56) and Hwang et al. (2017, pp. 26-42). The descriptive data of the questionnaire revealed consistently high motivation scores across all measured constructs, particularly with the total mean surpassing 4.6 on a 5-point scale. These findings provide compelling evidence that Quizlet positively influenced students' learning motivation with the EFL learning context, aligning with the conclusions of numbers of previous studies (Berns et al., 2016, pp. 1-23; Chen & Lin, 2016, pp. 171-186; Eltahir et al., 2021, pp. 3251-3278; Li, 2021, pp. 1-12; Tsai & Tsai, 2018, pp. 345-357). The significant variance in learning outcomes explained by motivation ($R^2 = .504$) indicates a remarkably strong relationship in educational contexts, where learning is typically influenced by numerous complex factors. This finding serves to reinforce the conclusions of previous DGBL research (Chen & Tu, 2021, pp. 1-16; Li & Pan, 2009, pp. 123-128; Lin et al., 2017, pp. 123-127), confirming that motivation serves as a powerful predictor of performance within game-based learning environments.

The absence of a notable difference in listening comprehension, as indicated by the non-significant p-value of .266, may be ascribed to several factors. First, the inherent characteristics of Quizlet primarily emphasise visual and text-based interaction. Despite the inclusion of a pronunciation option in flashcards, the design of this study focused on its gaming features (e.g. Match Game, Blast and Classic Live), which may not directly address the complex cognitive processes involved in listening comprehension. In contrast to vocabulary or reading, listening comprehension requires multiple cognitive processes, including phonological awareness and working memory, which Quizlet may not adequately replicate (Vandergrift & Baker, 2015, pp. 390-416). Second, the duration or intensity of the intervention might have been inadequate to promote remarkable improvements in listening, a skill that typically requires extended exposure to authentic spoken input (Chang & Millett, 2016, pp. 349-362).



SUGGESTION

This study is still subject to certain limitations. It employed a rather homogeneous sample and a questionnaire with certain constraints. The study didn't address potential confounding variables such as students' prior experience with digital game-based tools, their engagement outside of class, or teacher involvement, all of which could influence learning outcomes. For future research investigating DGBL in EFL contexts, researchers should expand participant diversity in size, academic backgrounds, and proficiency levels to better determine Quizlet's effectiveness across broader populations to increase the generalizability of the findings. Additionally, incorporating mixed-methods approaches with qualitative elements (interviews, reflective journals) would provide deeper insights into student experiences with DGBL tools. Research should also consider moving beyond the ARCS Model's focus on external motivators to explore intrinsic motivation through frameworks like Self-Determination Theory, which examines intrinsic vs. extrinsic motivation, autonomy, competence, and relatedness as deeper drivers of engagement.

REFERENCES

Aguilera, E., & de Roock, R. (2022). *Digital game-based learning: Foundations, applications, and critical issues* (Oxford Research Encyclopedia of Education). <https://doi.org/10.1093/acrefore/9780190264093.013.1438>.

Berns, A., Isla-Montes, J. L., Palomo-Duarte, M., & Dodero, J. M. (2016). Motivation, students' needs and learning outcomes: A hybrid game-based app for enhanced language learning. *SpringerPlus*, 5(1305), 1-23.

Cárdenas-Moncada, C., Véliz-Campos, M., & Véliz, L. (2020). Game-based student response systems: The impact of Kahoot in a Chilean vocational higher education EFL classroom. *Computer-Assisted Language Learning Electronic Journal*, 21(1), 64-78.

Chang, A. C., & Millett, S. (2016). Developing L2 listening fluency through extended listening-focused activities in an extensive listening programme. *RELC Journal*, 47(3), 349-362.

Chen, H. R., & Lin, Y. S. (2016). An examination of digital game-based situated learning applied to Chinese language poetry education. *Technology, Pedagogy and Education*, 25(2), 171-186.

Chen, C. C., & Tu, H. Y. (2021). The effect of digital game-based learning on learning motivation and performance under social cognitive theory and entrepreneurial thinking. *Frontiers in Psychology*, 12, 1-16.

Cheng, H. F., & Dörnyei, Z. (2007). The use of motivational strategies in language instruction: The case of EFL teaching in Taiwan. *International Journal of Innovation in Language Learning and Teaching*, 1(1), 153-174.

Dizon, G. (2016). Quizlet in the EFL classroom: Enhancing academic vocabulary acquisition of Japanese University students. *Teaching English with Technology*, 16(2), 40-56.



Eltahir, M. E., Alsalhi, N. R., Al-Qatawneh, S., AlQudah, H. A., & Jaradat, M. (2021). The impact of Game-Based Learning (GBL) on students' motivation, engagement and academic performance on an Arabic language grammar course in higher education. *Education and information Technologies*, 26, 3251-3278.

Guo, Y. R., Goh, D. H. L., Luyt, B., Sin, S. C. J., & Ang, R. P. (2015). The effectiveness and acceptance of an affective information literacy tutorial. *Computers & Education*, 87, 368-384.

Hao, K. C., & Lee, L. C. (2021). The development and evaluation of an educational game integrating augmented reality, ARCS model, and types of games for English experiment learning: An analysis of learning. *Interactive Learning Environments*, 29(7), 1101-1114.

Huang, W. H. D., Hood, D. W., & Yoo, S. J. (2014). Motivational support in Web 2.0 learning environments: a regression analysis based on the integrative theory of motivation, volition and performance. *Innovations in Education and Teaching International*, 51(6), 631-641.

Huang, W., Huang, W., Diefes-Dux, H., & Imbrie, P. K. (2006). A preliminary validation of attention, relevance, confidence and satisfaction model-based instructional material motivational survey in a computer-based tutorial setting. *British Journal of Educational Technology*, 37(2), 243-259.

Hung, H. T., Yang, J. C., Hwang, G. J., Chu, H. C., & Wang, C. C. (2018). A scoping review of research on digital game-based language learning. *Computers & Education*, 126, 89-104.

Hwang, G. J., Hsu, T. C., Lai, C. L., & Hsueh, C. J. (2017). Interaction of problem-based gaming and learning anxiety in language students' English listening performance and progressive behavioral patterns. *Computers & Education*, 106, 26-42.

Kazu, İ. Y., & Kuvvetli, M. (2023). A triangulation method on the effectiveness of digital game-based language learning for vocabulary acquisition. *Education and Information Technologies*, 28(10), 13541-13567.

Keller, J. M. (1987). Strategies for stimulating the motivation to learn. *Performance and Instruction*, 26(8), 1-7.

Keller, J. M. (2010). Tools to support motivational design. In: J. M. Keller (Ed.), *Motivational design for learning and performance: The ARCS model approach* (pp. 267-295). Springer.

Li, P., & Pan, G. (2009). The relationship between motivation and achievement--A survey of the study motivation of English majors in Qingdao Agricultural University. *English Language Teaching*, 2(1), 123-128.

Li, R. (2021). Does game-based vocabulary learning APP influence Chinese EFL learners' vocabulary achievement, motivation, and self-confidence? *Sage Open*, 11(1), 1-12.



Lin, C. H., Huang, S. H., Shih, J. L., Covaci, A., & Ghinea, G. (2017). Game-based learning effectiveness and motivation study between competitive and cooperative modes. In Kinshuk, D. G. Sampson, R. Vasiu, M. Chang, N.-S. Chen, and R. Hunag (Eds.), *the Proceeding of 2017 IEEE 17th International Conference on Advanced Learning Technologies (ICALT)* (pp. 123-127). IEEE.

Pivec, M. (2007). Play and learn: potentials of game-based learning. *British Journal of Educational Technology*, 38(3), 387-393.

Prensky, M. (2001a). *Digital game-based learning*. McGraw-Hill.

Prensky, M. (2001b). Digital natives, digital immigrants part 2: Do they really think differently? *On the Horizon*, 9(6), 1-6.

Prensky, M. (2005). Computer games and learning: Digital game-based learning. *Handbook of Computer Game Studies*, 18(2005), 97-122.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(1), 54-67.

Schunk, D. H., Meece, J. L., & Pintrich, P. R. (2014). *Motivation in education: Theory, research and applications* (4th ed.). Pearson.

Tsai, Y. L., & Tsai, C. C. (2018). Digital game-based second-language vocabulary learning and conditions of research designs: A meta-analysis study. *Computers & Education*, 125, 345-357.

Vandergrift, L., & Baker, S. (2015). Learner variables in second language listening comprehension: An exploratory path analysis. *Language learning*, 65(2), 390-416.

Xu, Z., Chen, Z., Eutsler, L., Geng, Z., & Kogut, A. (2020). A scoping review of digital game-based technology on English language learning. *Educational Technology Research and Development*, 68(3), 877-904.

The content, as well as the use of language in the article, is the responsibility of the author.

