

# English word learning software design based on octagonal behavior analysis theory and situational cognition theory

Dingrui Liu, Haiying Wang

(College of Art and Design, Zhejiang A&F University, Hangzhou 31000, China)

**Abstract:** With the rapid development of Internet technology today, word APP is the result of the development of “Internet + education” to a certain stage. Its appearance has brought a new way of learning for the learning group. However, most of the products on the market are seriously homogenized, lack of interest, poor learning effect and low efficiency. This paper studies the design of English word learning software, takes octagonal behavior analysis theory and situational learning theory as theoretical guidance, designs game links and constructs reasonable story plots according to the characteristics of target groups, integrates gamification and situational learning into English learning, and verifies experimental hypotheses through data collection and analysis in EEG experiments after the design is formed. In order to enhance the interest of learning, improve the user’s attention level and active learning willingness, and improve the user’s learning effect and efficiency.

**Key words:** Octagonal behavior analysis theory; Situational learning theory; Brain electricity; English word learning

## 1. Background

Through the investigation of the existing word learning apps in the market, it is found that there are common experience defects in the current apps: single learning form, lack of interest; Poor learning effect, low willingness of users to continue to use, poor product stickiness. The single learning of content in digital products and the neglect of the stimulation effect of the real environment are the deep-rooted reasons for the current problems of language learning apps. It is necessary to develop interesting learning experience, gamified encouragement and feedback mechanism, and increase social and interactive strategies to improve user engagement and stickiness.

## 2. Octagonal behavior analysis theory and situational cognition theory

Octagonal Behavior Analysis is a model developed by Yu-kai Chou to build game appeal. He summarizes the core drivers of users into eight types: mission, achievement, empowerment, ownership, social, scarcity, unknown, and loss. Richard Bartoo identifies four types of gamers: achievers, explorers, socializers, and killers. The four types of gamers are shown in Figure 1. According to the initiative of learning and the interactivity of behavior, Yu-kai Chou divides the learner types into four types of game players: goal type, exploration type, interactivity type, and competition type. The learner types are shown in Figure 2.

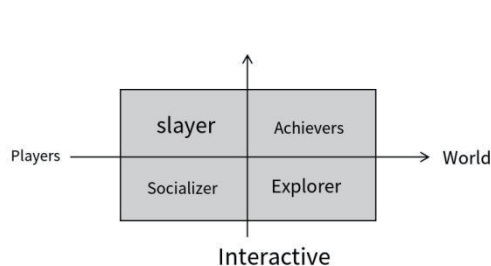


FIG. 1 Four types of game players

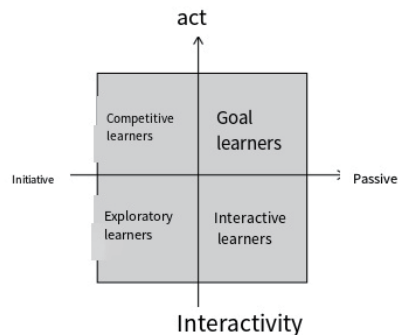


FIG. 2 Learner types

According to the theory of situational cognition, knowledge and activities cannot be separated. Learning is a process in which learners acquire knowledge in real situations as well as experience and skills to solve practical problems. It is a process in which learners constantly establish their own new knowledge system by means of interaction with real situations. Only by integrating learning into the actual application scenarios of relevant knowledge can meaningful learning be stimulated. These two theories are mature and perfect, and have guiding significance for the gamification design of word software.

## 3. Interactive model

Yueti APP is an APP for college students’ word learning. The interactive model uses octagonal behavior analysis to design a mechanism of continuous exploration based on the characteristics of exploratory learners who like to learn unknown knowledge and keep exploring, and builds specific story plots based on situational cognition theory. By integrating appropriate words into real plots for learning. The application of situational cognition theory in design emphasizes the close relationship between knowledge construction and the setting of specific communication scenes, and attaches importance to the development of learners’ ability to use knowledge and experience gained through scenes, which is conducive to mobilizing learners’ enthusiasm for learning, improving concentration and active learning willingness, so as to

improve learning efficiency and continuous learning willingness.

The APP allows users to learn words in games by providing real interactive situations, designed specific plots, and gamified word learning processes. The user is set as an operator, whose business scope includes all walks of life. With the continuous expansion of business scope, the user will unlock more different scenes, and design different game plots in different scenes, which are full of unknown challenges and fun. The user will continue to learn in the step by step exploration of the scene and plot, and finally complete the learning task to achieve their goals.

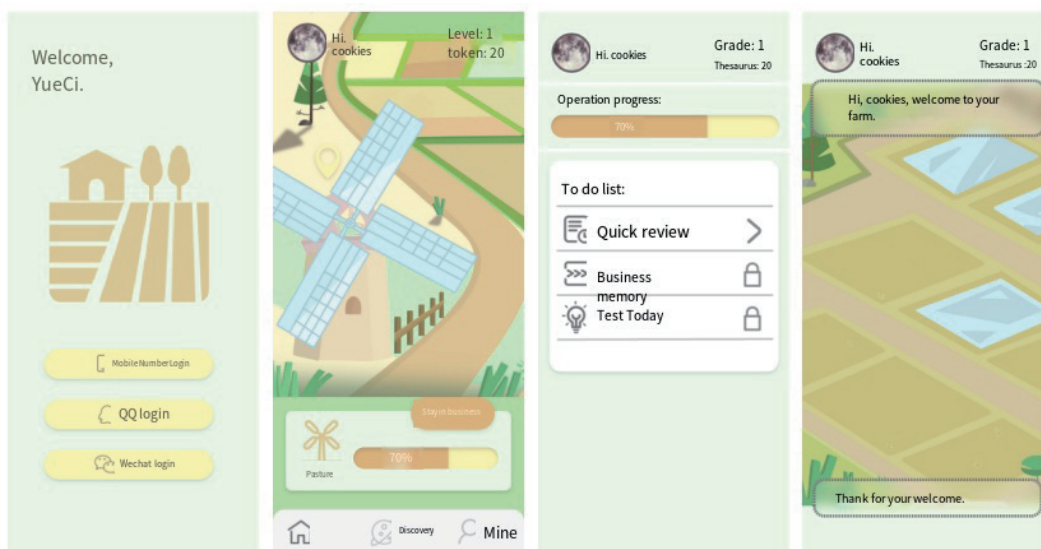


Figure 3. Design and display of some pages of Yue Ci APP

## 4. Experimental design

### 1. Research content

This study takes 20 senior students in Zhejiang A & F University as the research objects. The control group adopted the traditional App English word learning mode, while the experimental group adopted the interactive model under the guidance of situational cognition theory. The subjects were divided into two groups, and the two learning methods were used to test whether the teaching was more effective than the traditional listening teaching.

### 2. Research questions and hypotheses

Based on the above evidence, the research question is: Is there a significant difference between the pre-test and post-test scores of college students who use different word learning methods? Are there significant differences in their attention levels? That is, is there a difference in the learning effect between the students who use the word learning method guided by the situational cognition theory and the traditional APP word learning method? Is there any difference in the attention level between students who learn words under the guidance of situational cognition theory and traditional APP word learning?

Based on the research question, the following two hypotheses are made:

A Learning style: word learning under the guidance of situational cognition theory

B Learning mode: traditional APP word learning mode

Research hypothesis (H1) : There is A significant difference in average, and the effect of learning style A is significantly better than that of learning style B.

Research hypothesis (H2) : There is A significant difference in the mean, and the attention level of learning style A is significantly better than that of learning style B.

### 3. Experimental process

Divide 20 students evenly into two groups of 10 each. The first group of students filled in the questionnaire 1, the statistical accuracy rate, then wore the EEG device to collect the EEG electrical signal, and studied in the learning mode A. After learning, they filled in the questionnaire 1 again, the statistical accuracy rate. The second group of students filled in questionnaire 2 to collect the correct rate of statistics, then wore the EEG device to collect the EEG signal and learned it by learning method B. After learning, they filled in questionnaire 2 again and collected the correct rate of statistics.

### 4. Data analysis

Independent sample T test was used to compare the difference between the pre-test scores and post-test scores of the two groups and whether the difference in attention level between the two groups was significant. If the difference was significant, hypothesis (H1) and hypothesis (H2) were valid; if the difference was not significant, hypothesis (H1) and hypothesis (H2) were not valid.

SPSS analysis results are as follows:

		Vegetable variance equality test				Mean equivalence t test				
		F	significance	t	Degree of freedom	Significance (two-tailed)	Difference in mean	Standard error difference	Upper 95% confidence interval for the difference	
									Lower bound	
Difference between pre-test scores and post-test scores	Assumed equal variance	905.	369.	2.794	8	023.	2.200	787.	384.	4.016
	Do not assume equal variance			2.794	6.482	029.	2.200	787.	308.	4.092
Concentration Index	Assumed equal variance	4.653	063.	3.427	8	009.	29.800	8.695	9.750	49.850
	Do not assume equal variance			3.427	4.559	022.	29.800	8.695	6.783	52.817

**FIG. 4 Independent sample test results**

## 5. Experimental conclusion

Compare the difference between pre-test scores and post-test scores, look at the Levin variance isogeneity test, the test significance value of  $0.369 > 0.05$ , consider the variance homogeneity, look at the first line assumed equal variance. The significance (double-tailed) was  $0.023 < 0.05$ , which showed a difference at the 0.05 significance level. It can be judged that hypothesis (H1) is valid, that is, the effect of learning style A is significantly better than that of learning style B.

Compared with the concentration index, look at Levin's isotropic test of variance, the test significance value is  $0.063 > 0.05$ , consider the homogeneity of variance, look at the first line assumes the isovariance. Significance (double tail)  $0.009 < 0.05$ , showing a difference at the 0.05 significance level. It can be judged that hypothesis (H2) is valid, that is, the attention level of learning style A is significantly better than that of learning style B.

In summary, through comparative experiments and data analysis, it can be concluded that the design of English word learning software based on octagonal behavior analysis theory and situational cognition theory can effectively improve users' attention level and active learning willingness, and improve users' learning effect and efficiency.

## References:

- [1] Yuxin Liu. Research on User Experience Design of Language Learning App [D]. Jiangnan University, 2020.
- [2] Yuxin Liu, Feng Wang. Research on Language Learning APP Design for Optimizing User Experience [J]. Packaging Engineering Art Edition, 2021, 42(4): 8-103.
- [3] Xue Wang. Situational Cognition Theory and English Translation Teaching in Colleges and Universities [J]. Educational Exploration, 2012(12): 66-67. (in Chinese)
- [4] Yanli Wei, Xuan Zhou, Yuwei Liu. Research on gamification Driving Design of learning APP based on Octagonal Behavior analysis [J]. Packaging Engineering, 2021, 42(08): 148-155.
- [5] Wanwan Gao. Semi-professional vocabulary teaching of Medical English based on Situational cognition theory [J]. Modern English, 2020(24): 19-21
- [6] Chaoping Wang, Yi Feng. Statistical analysis of Independent sample T-test -- An empirical study on the effectiveness of multimodal listening Teaching for vocational College students [J]. English Abroad, 2021(23): 75-76.

The article is a Research project of Research and Development Fund of Zhejiang A & F University: Identification Efficiency of Binary Signs (Project number: 2020FR021).