

# Optimization of Online Vocabulary Learning Platform Based on Kano Model

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## ABSTRACT

In the case of a worldwide epidemic, a lot of vocabulary learning software and applications have shown up in the online app stores in China. The Study built a demand system with 8 dimensions and 31 features from three aspects, including content, function and design. On such a basis, users of vocabulary learning platforms were taken as the objects of research. Then, with Kano Model theory and research methods, the statistic analysis of data was conducted to obtain the results of demand evaluation. The satisfaction and dissatisfaction coefficients were calculated as well. On this basis, users' demands were classified into four-quadrant diagrams and obtained 8 Must-be attributes, 6 One-dimensional attributes, and 11 Attractive attributes. The research prioritized the platform features and proposed corresponding design strategies. The purpose was to build more individualized online platforms for vocabulary learning and enhance learners' motivations. Finally, some principles of designing online vocabulary learning platforms were summarized to offer reliable guidance and suggestions on subsequent studies and functional designs in this field.

**Keywords:** Kano model, Online learning, User experience design

## INTRODUCTION

Learning a new language is of great necessity in globalization, and vocabulary is the basis to learn a new language. In the case of a worldwide epidemic, online learning has gained widespread favor; a lot of vocabulary learning software and applications have shown up in the online app stores in China. However, with the constantly-changing in user demands, online vocabulary learning software has also encountered some challenges: (1) Online learning platforms have become somehow similar, making it hard to distinguish their respective features. (2) Online learners also differ in terms of motivations and preferences in learning. It is necessary to pay attention to learners' particular preferences so as to stimulate their motivations for learning. (3) Various and chaotic functions and hierarchies of online learning platforms have perplexed users. Therefore, the emphasis of current researchers is to focus on users' needs, provide them with valuable functions and meet their demands.

This study summarized the features provided by the major vocabulary online learning platforms and derived a functional system for online learning platforms. Through the analysis of the Kano model, the functional attributes of the platform were prioritized to optimize the platform functions and improve user satisfaction.

## LECTURE REVIEW

### Research Status of Online Learning Platform

Online learning refers to a learning method that uses wireless mobile communication network technology and equipment to study. It has the advantages of trans-temporality, diversity, personalization. Currently, scholars have carried out comprehensive research from different perspectives. With regard to functional resources, it is possible to boost the effectiveness of online study in a pluralistic way by delivering rich resources and cooperation (Cai H and Zhang S, 2021); it is also feasible to promote users' learning persistence via certain feedback and incentive mechanisms such as honor accomplishment experience, incentive mechanism (Tan Z and Jiang X, 2020). With regard to design, the conciseness of the website interface and the precision of page navigation can significantly impact the operational efficiency of the user platform (Zhang X et al., 2008).

### Research Status of Vocabulary Learning

Vocabulary learning plays a vital role in building students' language structures and improving their language skills. Research on vocabulary study can be traced back to Wilkins (1974) noted that learners should grasp vocabulary and grammar in language learning.

This paper conducted research from the perspective of Chinese students learning English and sorted out the vocabulary learning approaches with two representative features. First and foremost, attention should be paid to the individualized differences of users. Some scholars have revealed that learners' age, language level, and cultural context enable the adoption of different strategies for vocabulary learning (Schmitt and McCarthy, 1997). Second, enriched learning approaches should be applied to reinforce vocabulary memorization. A number of scholars have verified that examples, multimedia annotations (text, image, sound, animation.) (Chun and Plass, 1996), multimodal annotations (Li H and Li Y, 2007) and presentation (Liu L, 2014) are conducive to lexical acquisition and prolonged memorization of English vocabulary. Learning methods such as photo-video lectures and English-speaking communities have also been proven effective (Li R, 2014).

In conclusion, previous research tended to investigate the effectiveness of diverse functions from the viewpoint of researchers. This paper conducted functional interest research from the user's perspective to complement this field.

## RESEARCH METHODOLOGY

This study collected original data by non-intrusive user interviews, in-depth interviews with 4 English students, 4 English teachers, 10 English learners and 2 design students via documentary and observational methods. Subsequently, the KJ method collated and categorized the key vocabulary from the interviews. Meanwhile, the content of the online vocabulary learning platform was sorted out with respect to the research results of formerly related learning platforms. With the Delphi method, experts from the industry were invited to

**Table 1.** Feature list of vocabulary online learning platform.

Dimension	Features	Introduction of the features
Word information (A)	A1 Spelling	Spelling
	A2 Pronunciation	Phonetic symbol and pronunciation
	A3 Meaning	Chinese Meaning
	A4 Example sentences	Examples containing this word from dictionaries, classics, dramas, etc.
	A5 Synonyms	Synonyms
	A6 Dictionaries	Definitions of different dictionaries
	A7 Word roots	Help users to memorize quickly
Memory aid (B)	B1 Picture	Create pictures associated with words to help users deepen their memory
	B2 Video	Word-related videos, episode excerpts
	B3 Memorization tips	Jingle, homophonic, etc. to help users memorize more quickly
Vocabulary learning (C)	C1 Collection	Collect unfamiliar words for review
	C2 Familiarity check	Determines the user's familiarity with the word through the three grades of "memorized", "impressed" and "don't remember"
	C3 Dictation	Dictate words
	C4 Word Guessing	Guess the meaning of a word based on its spelling
Study statistics (D)	D1 Learning curve	Daily word memory statistics
	D2 Learning statistics	Study time statistics
	D3 Status of check-in	Status of check-in
	D4 Word volume	Test of the word volume
Planning (E)	E1 Teaching materials	Selection of teaching materials
	E2 Target design	The number of words to be recited
	E3 Forgetting Curve	Scientific method of memory
Interaction (F)	F1 Timely feedback	Provide quick feedback to users
	F2 Common operation	Interoperability conforms to normal operating principles
	F3 Simple interaction	Respect the user's operating habits without violating the basic operating norms,
	F4 Immersion	Users could concentrate on learning
	F5 A sense of control	Be competent for the current learning task
	F6 Intuitive partition	Intuitive partitioning of functions
Cross-platform (G)	G1 Phone	No time and place restrictions
	G2 IPAD	Bigger screen
	G3 PC	Shows more, but less flexibility
visual design (H)	H1 Reasonable interface layout	Establish a good visual hierarchy
	H2 Beautiful interface	The interface color matching is reasonable and the key points are prominent
	H3 Dark mode	Guaranteed readability in low light
	H4 Reasonable font size	In order to improve reading comfort

make modifications to the functions, and ultimately built a demand system with 8 dimensions and 31 functions from three aspects, including content, function and design. As shown in Table 1.

**Table 2.** Kano questionnaire sample form.

Positive question	“How would you feel if the online vocabulary learning platform offered a ‘word spelling’ feature”	Like it Expect it
Negative question	“How would you feel if the online vocabulary learning platform did not offered a ‘word spelling’ feature”	Don’t care Live With Dislike

**Table 3.** The Kano model evaluation table.

Functional	Dysfunctional				
	Like it	Expect it	Don’t care	Live with	Dislike
Like it	Q	A	A	A	O
Expect it	R	I	I	I	M
Don’t care	R	I	I	I	M
Live With	R	I	I	I	M
Dislike	R	R	R	R	Q

Notes: A=Attractive, O=One-dimensional, M=Must-be, I=Indifferent, R=Reverse, Q=Questionable.

### Questionnaire Collection and Validity Testing

The questionnaire adopted a standardized form and was divided into two parts: The first part was the user’s basic information, which included the user’s gender, education, age, occupation, and the frequency of using English vocabulary app; The second part was the Kano questionnaire. The Kano questionnaire had 36 functional bidirectional questions: 16 positive questions and 16 negative questions. There were five options for each question, as shown in Table 2.

Due to the impact of the epidemic, the study used a web-based questionnaire to conduct the research. The research targeted groups with English vocabulary learning needs, including students learning English, English teachers, UI designers, product managers, etc.

A total of 150 questionnaires were collected. Through the cleaning of invalid questionnaires, a total of 141 valid answers were obtained. The recovery rate of the questionnaire was 94%.

The reliability and validity of the questionnaire were tested using SPSS: the reliability coefficient value of this questionnaire was 0.923 which was greater than 0.8, indicating that this questionnaire has strong reliability. In the validity test, the KMO test value was 0.775, which was greater than 0.6, and the Bartlett’s sphere test statistical value of significant probability is 0.000, which is less than 0.01, which proves that the questionnaire has good validity.

### Analysis

According to the Kano model evaluation table (Table 3), the study organized the questionnaire results, and conducted statistical analysis on various online learning-related functions.

This study used the Better-Worse coefficient proposed by Bogle to measure the user satisfaction index and the calculation formula is as follows. The

**Table 4.** Kano questionnaire evaluation form.

	A(%)	O(%)	M(%)	I(%)	R(%)	Q(%)	KANO Categories	Better	Worse
A1	8.51	21.28	38.30	23.40	4.26	4.26	M	0.32	-0.65
A2	2.12	27.66	48.93	17.02	0.00	4.26	M	0.31	-0.80
A3	4.26	34.04	42.55	14.89	0.00	4.26	M	0.40	-0.80
A4	10.63	19.15	40.43	25.53	0.00	4.26	M	0.31	-0.62
A5	4.26	34.04	42.55	14.89	0.00	4.26	A	0.44	-0.34
A6	10.63	19.15	40.42	25.53	0.00	4.26	I	0.31	-0.46
A7	21.28	23.40	12.77	42.55	0.00	0.00	A	0.44	-0.36
B1	31.91	17.02	12.76	38.29	0.00	0.00	A	0.50	-0.30
B2	27.66	14.89	12.77	19.15	2.13	2.13	A	0.57	-0.37
B3	29.79	21.27	8.51	42.55	0.00	2.13	A	0.50	-0.29
C1	10.64	28.37	25.53	31.91	0.00	1.42	M	0.40	-0.55
C2	27.65	23.40	17.02	31.91	0.00	0.00	A	0.51	-0.40
C3	31.91	23.40	14.89	27.66	2.13	0.00	A	0.56	-0.39
C4	23.40	19.15	14.89	40.42	2.13	0.00	A	0.43	-0.34
D1	19.14	23.40	12.77	44.68	0.00	0.00	I	0.42	-0.36
D2	17.73	34.75	19.14	25.53	0.00	0.70	O	0.54	-0.55
D3	14.19	10.63	6.38	71.63	1.42	0.00	I	0.23	-0.17
D4	18.43	21.99	17.73	39.72	0.00	0.00	I	0.41	-0.40
E1	22.70	18.43	17.02	39.72	0.00	2.84	I	0.42	-0.36
E2	21.27	19.86	18.43	40.42	2.13	0.00	I	0.41	-0.38
E3	30.50	14.89	5.67	46.80	2.13	2.13	A	0.45	-0.21
F1	6.38	39.00	33.33	20.56	0.70	2.13	O	0.46	-0.73
F2	4.26	34.75	33.33	27.65	0.00	0.00	M	0.39	-0.68
F3	6.38	36.17	29.79	26.95	0.70	0.00	M	0.42	-0.66
F4	23.40	40.42	10.63	25.53	0.00	0.00	O	0.62	-0.50
F5	22.69	36.17	8.51	31.21	0.00	1.42	A	0.60	-0.45
F6	11.34	47.52	18.44	21.99	0.00	0.70	O	0.59	-0.66
G1	2.13	44.68	38.29	12.76	4.26	0.00	O	0.47	-0.84
G2	23.40	19.14	17.02	38.29	0.00	0.00	A	0.43	-0.36
G3	16.31	15.60	15.60	47.51	2.12	0.00	I	0.34	-0.31
H1	12.77	32.62	31.91	21.28	0.00	1.41	O	0.46	-0.65
H2	19.15	36.17	21.28	23.40	0.00	0.00	O	0.53	-0.55
H3	10.64	21.28	17.03	44.68	0.00	6.38	I	0.34	-0.39
H4	6.38	21.98	41.13	28.37	1.41	0.70	M	0.29	-0.64

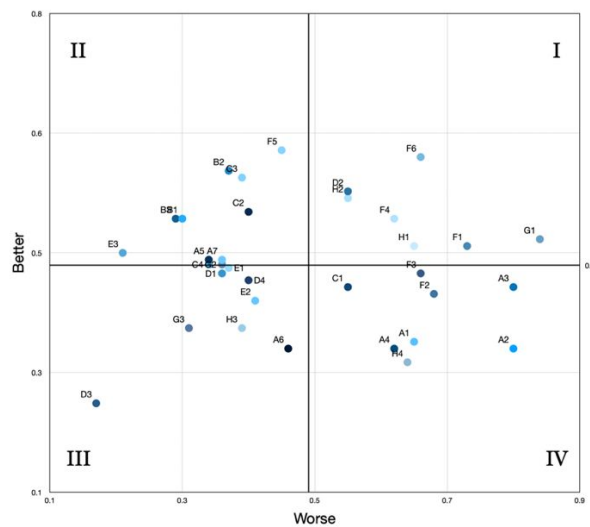
Better value indicates how much user satisfaction is increased by providing quality elements, while the Worse value indicates how much user satisfaction is decreased by not providing the feature.

$$\text{Better(SII)} = (A + O)/(A + O + M + I) \quad (1)$$

$$\text{Worse(DDI)} = (-1)(O + M)/(A + O + M + I) \quad (2)$$

In this way, the evaluation results of all functions of the platform were calculated, as shown in the Table 4.

Taking the absolute value of the Worse coefficient of each function as the abscissa, the Better coefficient as the ordinate, and taking the average value of



**Figure 1:** The better-worse coefficient analysis quadrant graph.

the two coefficients ( $| -0.43|$ ,  $0.48$ ) as the coordinate center, the coordinates were divided into four quadrants, as shown in Figure 1.

## DESIGN PIONT

According to the above figure, the basic design strategy of the online vocabulary learning platform was proposed:

### On the Basis of Must-Be Features

As for the features, a series of word-related features such as “spelling”, “pronunciation”, “meaning”, “example sentences” and “collection” are used as basic requirements, and all the features are comprehensively covered to guarantee the normal operation. As the basic learning elements of words, “pronunciation” and “meaning” shall keep the source of information transparent and precisely labeled. As a tool to facilitate users’ comprehension and memorization, the “example sentences” should be representative and contain various uses of words. Regarding platform design and development, the platform should respect the user’s operating habits without violating the basic operating norms. It should be user-friendly so that the user does not consume too much energy in operation, thus affecting the learning efficiency. Moreover, a proper font size should be selected to match the display of the screen to improve the user’s reading comfort.

### Enhancing User Satisfaction by Emphasizing Attractive Features

The quality of attractive features directly impacts the satisfaction of learners regarding the support services. “Learning statistics” is the most gratifying feature for users, and the platform should ensure its investment. Presenting users’ learning process via data and charts enhances the understanding of

users' learning process, thereby stimulating their learning motivation. Meanwhile, it is crucial to provide users with explicit learning feedback for every step. It allows users to have a clear picture of their current learning status, feeling a greater sense of control over the learning process. Concerning the operation of the platform, the focus should be placed on the intuitive partitioning of functions and the application of a logical interface layout to boost the user's working experience. When it comes to design, it is essential to select color scheme and visual pattern that is more in line with the target users so as to attract a wider range of users. Besides, users tend to believe that a pleasing design is a practical one, and a neat interface will conceal certain usability defects for the product.

### **Boosting Market Competitiveness by One-Dimensional Features**

The One-dimensional features are categorized into three aspects. (1) Auxiliary information for words, covering five contents such as "synonyms", "word roots", "images", "videos" and "memorization tips". Given sufficient funds and technical standards, it should make sure that services of this kind are available as much as possible to fulfill users' advanced needs and raise the competitiveness of online vocabulary study platforms. (2) Consolidation and reinforcement of word acquisition, covering "word dictation", "word guessing" and "Ebbinghaus Forgetting Curve". Depending on the user's acquisition of words, the platform should follow the memory rule of The Ebbinghaus Forgetting Curve and update the user's word review plan accordingly. The flexible learning strategy is beneficial in helping learners to accomplish the current task effectively, resulting in improving learners' control over online learning and triggering motivation for online learning (Wang H, 2021). (3) Cross-device tool support. Users can choose the learning hardware that fits their needs. The backup port should also be put into use in case of the failure of the original port, preventing the distraction of learning momentum caused by the tool.

### **Paying Attention to Indifferent Features**

The Better-Worse factors for "dictionary", "dark mode", "computer port", and "target design of vocabulary" are quite low. Hence platforms may consider cutting down on these four requirements if capital is running low. For platforms that have not yet provided these four features, they can withhold the provision of these three services. The Better coefficients of "learning curve", "test of the word volume" and "selection of teaching materials" are relatively high, which are in the middle phase of charismatic and undifferentiated demand. These features will undergo a type shift in the order of I-A-O-M over time in accordance with the Kano type. Therefore, these features are of some potential, and the pivotal time for the transformation of these functions should be captured. These features and services should be added to the platform so as to increase user satisfaction.

## CONCLUSION

This study prioritized the platform features and proposed corresponding design strategies through the analysis of the Kano model and the four-quadrant diagram. Then the study provided guiding suggestions for vocabulary online learning platforms and provided a basis for follow-up research. The availability of the must-be features determines whether users can use this platform, and the attractive features determine whether users choose this platform. The design of an online learning platform should pay attention to the arrangement of different features, so as to have its characteristics and improve user satisfaction.

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