

Innovation in Japanese Vocabulary Teaching Based on Constructivist Theory: Taking Root and Affix Association as an Example

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ABSTRACT Japanese vocabulary learning often involves heavy memorization loads, rapid forgetting, and insufficient ability to apply words flexibly. Based on constructivist theory, this paper proposes a root and affix association teaching method for Japanese vocabulary instruction. The method includes three steps: guiding learners to identify structural patterns of Chinese-character roots and native Japanese affixes, establishing morphological analysis ability; connecting new vocabulary with existing knowledge structures through association training to construct a semantic vocabulary network; and designing task-based practice activities to promote active construction of a knowledge system. Sixty intermediate-level Japanese learners are selected and divided into an experimental group and a control group, with 30 students in each group, for a 12-week teaching intervention. The results show that the experimental group achieves an average immediate vocabulary test score of 87.3, compared with 72.8 in the control group. The delayed test retention rate after four weeks is 91.2% in the experimental group and 73.5% in the control group. Vocabulary application ability in the experimental group is 23.7% higher than that in the control group. The method effectively reduces memory burden and improves long-term retention and application accuracy.

INDEX TERMS constructivist theory, japanese vocabulary teaching, root and affix association, associative memory, vocabulary retention

I. INTRODUCTION

THE difficulty of vocabulary memorization in Japanese vocabulary acquisition often mirrors the intricate precision required in engineering, where failing to reinforce linguistic patterns leads to a breakdown in the structural integrity of a learner's foundational knowledge. Similar to how a flaw in a technical weave compromises the entire fabric, inconsistent retention in the classroom remains a persistent hurdle within the broader context of technical industry training. Japanese vocabulary system consists of three sources namely: kanji words, native words, and loanwords. Moreover, the high frequency of homophones in Japanese often leads learners to treat words as isolated, arbitrary symbols, resulting in significant cognitive confusion and rapid forgetting to memorize knowledge and forget it quickly as they face a high level of confusion and cannot apply it flexibly. Vocabulary at intermediate levels is at levels that are very high and only through repetitive methods of memorising cannot sustain the learning requirements any longer. The contemporary instructional methods pay more attention to the contribution of the surface form of vocab-

ulary, disregarding the unveiling of internal morphological structure and semantic logic of words. Learners do not have the facility to tie the new words into the previous knowledge and establish a systematic vocabulary cognitive network. This discontinuous learning model does not only augment the cognitive load but also impairs the acquisition of holistic language application competence, and there is an imminent need to discover creative learning directions that are in line with cognitive laws [1,2].

Constructivist theory highlights the fact that learners construct knowledge actively and the new knowledge needs to be effectively associated with the existing cognitions in order to acquire it. Japanese morphological analyzability is also evident in Japanese vocabulary, in particular the kanji word, and the affixes and roots are regular, which offers good constructivist teaching materials. The root and affix association teaching approach exploits semantic transparency of the morpheme in the form of kanji and the functional marking of the affix to establish learners to deconstruct the inner organization of the vocabulary, comprehend the logic of creating the meaning of words by the means of

morpheme analysis, and turn the learning of vocabulary into the process of problem solving. Such an approach does not only engage the native language knowledge reserves of learners, but also enhances their awareness of morphological analysis and their ability to find analogies, inviting them to jump over the memorization of words to the building of word families. This paper confirms the efficacy of such a method through empirical research, providing a theoretical and practical foundation for reforming Japanese vocabulary instruction within the specialized context of the industry [3,4].

II. RELATED WORK

The theory of constructivism has been used extensively in the teaching of foreign languages since the 1980s, and the cognitive development theory and social construction theory have offered theoretical explanations of language learning. Similar research indicates that the processes of learning vocabulary in a foreign language must be founded upon the principles of meaning negotiation and reorganization of the knowledge, which means that Learners must turn into active creators of vocabulary information and not passive consumers. Domestic scholars have provided constructivist ideas to English vocabulary instruction and undertaken instruction experimentation on the terms of contextual construction, conceptual metaphor as well as chunk theory and confirmed the fostering impact of active construction plans on vocabulary memorization and use. Nevertheless, the amount of constructivist research dedicated to Japanese vocabulary teaching is comparatively limited, and most existing studies remain predominantly theoretical and lack systematic pedagogical frameworks or empirical testing protocols [5,6]. Root and affix method of teaching has developed a complete system in teaching of English. It aids learners to learn vocabulary by breaking down and building prefix, suffixes, and roots. The technique has been found to be highly effective in enhancing efficiency of vocabulary memorization and growth capacity. Japanese words, and in particular the kanji words, are also morphologically analyzable, although current researches lay more emphasis on the etymological elucidation of the individual kanji rather than the pedagogical merit of the affix system as well as the uncovering of the morpheme combination rules. Psychological studies have demonstrated that associative memory strategies cause the consistency of the memory traces and lower the forgetting rates as a result of the development of numerous mental associations. This mix of root and affix analysis and associative approach to teaching Japanese vocabulary matches both the morphological nature of Japanese vocabulary and the constructivist philosophy of learning, however, studies of systematic teaching model development and effectiveness evaluation have not yet been observed [7,8].

III. METHODS

A. THEORETICAL FRAMEWORK OF THE ROOT AND AFFIX ASSOCIATION TEACHING METHOD

Root and affix association method of teaching synthesizes the constructivist knowledge building and morphological nature of Japanese vocabulary in order to develop a systematic system of instruction. It is a framework founded on cognitive structures that already exist in learners and helps them to construct meaning actively by breaking down the internal elements of a vocabulary. The Chinese character root component focuses on the shared semantic core of kanji found in both Chinese and Japanese, enabling learners to leverage their prior linguistic knowledge. For instance, rather than memorizing 'jing ji' (economy) as an isolated symbol, learners are taught to identify 'jing' as a root associated with 'management/governance' and 'ji' with 'assistance/relief.' This morphological deconstruction allows intermediate learners to grasp the underlying logic of the compound without requiring exhaustive etymological memorization, thereby facilitating a more efficient encoding process compared to rote repetition [9,10]. The affix system is concerned with native Japanese elements with high-frequency affixes like *de*, *xing*, and *hua* as a semantic tag. When the logic of forming the words of international is mastered, students can deduce the words like historical and scientific.

The morpho-semantic mapping is what determines the linkage between the associations. On learning about the vending machine, learners are directed to subdivide it into automatic, vending, and machine having a comprehensive learning about it being the product of the combination of the three semantic units. The given deconstruction-reconstruction process promotes the formation of multidimensional bridges between the new and the old knowledge by the learners who introduce lexical information into the particular nodes of the already existing semantic net.

B. STRATEGIES FOR CULTIVATING MORPHOLOGICAL ANALYSIS ABILITY

Morphological analysis skills are first practised through vocabulary segmentation training, where learners are expected to segment compound words into their smallest semantic elements of semantics. In the teaching process, the long words belonging to the category of environmental protection movement are given, and the learners have to determine the limits of the three autonomous morphemes: the environment, the protection, and the movement, and name the part of speech and the role of semantics of each constituent. Segmentation activities utilize a Morpheme Function Labeling Table, where students document the properties of constituents. For example, in the word 'environmental protection movement,' students identify 'protection' as an action morpheme and 'movement' as a result-oriented affix. The trial-and-error process is implemented through 'Selection-Correction' tasks: learners are presented with potential combinations (e.g., 'growth-economy' vs. 'economic-growth') and must justify their selection based on internal semantic logic. Feed-

back is provided through a contrastive analysis of native-speaker corpora to help learners internalize the hierarchical arrangement rules of Japanese compounds. The morpheme combination rule training instruction teaches the learners to predict how new words should be formed. Having two morphemes, i.e. economy and growth, learners can guess the order of words in economy growth, with the help of verb-object relationship, and confirm that the same combination can be used in the real world. Wrong combinations e.g. growth economy are identified as not fitting the practices of morpheme arrangement in Japanese, and the rules of morpheme arrangement are learnt and internalized by trial and error.

C. LEXICAL SEMANTIC NETWORK CONSTRUCTION METHODS

Synonym clustering groups words with similar meanings into the same semantic field. Learners analyze the semantic boundaries of “learning,” “reluctantly,” “research,” and “cultivation,” and determine through example sentence comparison that “learning” applies to the acquisition of knowledge and skills, “reluctantly” emphasizes the process of effort, “research” emphasizes in-depth exploration, and “cultivation” refers to spiritual practice. Table 1 shows the semantic feature distribution of vocabulary related to the action of learning.

TABLE 1. Comparison of semantic features of learning action-related vocabulary

Vocabulary	Object scope	Effort level	Target nature	Usage Context
study	Knowledge and skills	medium	Mastering Application	Educational scenarios
reluctantly	Academic Content	high	Improved grades	Student language
Research	Specialized fields	Extremely high	Academic output	academic context
spiritual practice	Cultivation of mind and body	Persistence	Realm advancement	Religious culture
practise	Action skills	repetitive	Proficiency	Skills training

Table 1 presents the distinguishing features of five words in four dimensions: object, degree, target, and context. Learners can develop accurate word meaning discrimination ability through comparative analysis and avoid pragmatic errors caused by the misuse of synonyms.

D. DESIGN AND IMPLEMENTATION OF TASK-BASED PRACTICAL ACTIVITIES

The learners will be offered the materials that are real texts like global warming and economic development plans. They must subdivide the long words into morphemes and name the semantic value of each of the morphemes and combine the dissolved morphemes freely to form new words. As an illustration, when one takes out warm and modernization out of global warming and puts it together with modern one gets modernization. The learners will then confirm that the new words fit the rules of the Japanese word formation and verify their actual frequency of use through corpus consultation.

The topic-based vocabulary expansion task involves the learners to develop an entire vocabulary system with regard

to a specific topic. Considering the theme of environmental protection, learners begin with the basic word protection and come up with the derived words protection, protector, protected area and protection law and associate the words with the themes that are being discussed like environmental problems, environmental pollution, and environmental benchmarks. The learners will be required to draw a vocabulary map in the form of a topic, highlighting the hierarchical, causal, and modifying associations between the words and finally creating a semantic network diagram with no less than thirty related words.

The contextual writing activity evaluates the vocabulary use skills. The instruction provided to learners is to write a proposal of a corporate environmental policy. They will have to apply the morphological analysis skills acquired during this unit to incorporate professional terminologies like sustainability, resource recycling, and reduction of emissions in the text. The peers go through the submitted text and circle inappropriately formed words and clarify the reasons. The author thereafter reviews and makes an improvement on the text in consideration of the reviews.

IV. RESULTS AND DISCUSSION

A. EXPERIMENTAL DESIGN AND DATA ACQUISITION

The participants in the experiment were picked up among the sixty second year Japanese major students in one of the universities. Once similar levels were obtained by means of vocabulary and grammar tests, the students were selected into an experimental group and control group of 30 in each case. Intervention was supposed to be given to the experimental group through the root and affix association teaching method and to the control group through the conventional methods of vocabulary memorization. The same teacher taught both groups and there were 12 weeks, four hours a week and a total of 48 hours of instruction. The 600 target vocabulary words of the third volume of the newly-compiled Japanese textbook were used as the teaching materials for both the experimental and control groups to ensure consistency in instructional content. To evaluate whether the experimental group truly developed a generative skill rather than just better encoding for specific items, the delayed test included a ‘Transfer Section’ consisting of 20 novel compound words not present in the original 600-word set. This section required participants to apply morphological analysis to deduce the meanings of previously unseen vocabulary, thereby validating the method’s efficacy in fostering flexible application and independent decoding skills. Three testing points were used in data collection since a baseline test was used to determine the initial level of test before the beginning of instruction, immediate test which was used at the end of the 12th week to determine the effectiveness of short-term learning, and delayed test which was used at the end of week 16 to determine long-term retention. The exams were divided into three dimensions, which are vocabulary recognition, semantic discrimination, and vocabulary usage, and all the tests were administered in multiple

choices, fill-in-the-blank, and writing format, each had a maximum score of 100 points. This study was approved by the Ethics Committee of North Minzu University, and was performed in accordance with the principles of the Declaration of Helsinki. All eligible participants signed an informed consent form.

B. QUANTITATIVE ANALYSIS OF VOCABULARY LEARNING EFFECTIVENESS

The immediate test was conducted on the basis of the attainment of 600 target vocabulary words by assessing the learners within 48 hours of their completion of the week 12 of instruction. This was a three part test; 30 matching questions of words, 40 sentence completion question and a short essay (worth 30 marks) giving a total of 100 marks, with a time limit of 90 minutes. Word matching, sentence completion, and the short essay were used in testing the basic memorization skills, the contextual application, and the comprehensive vocabulary use respectively. The test was conducted on two groups of learners, but under the same conditions. The teachers were required to seal, number, and grade the papers. This was then followed by statistical analysis following the process of grading.

TABLE 2. Comparison of instantaneous test scores between the experimental group and the control group

Test Project	Average score of experimental group	control group average score	Difference
Semantic matching	28.6	24.3	4.3
Sentence Filling	35.2	28.7	6.5
Short essay writing	23.5	19.8	3.7
Total Score	87.3	72.8	14.5
Standard deviation	5.7	8.2	-

Table 2 indicates that the experimental group significantly outperformed the control group in all three testing dimensions in the three dimensions of test with a cumulative score being at 19.9%. The greatest disparity was the 6.5points in sentence completion section, which meant that the root and affix association instructional approach to vocabulary greatly enhanced the vocabulary of contextual application. The standard deviation

of the experimental group was smaller than that of the control group 5.7 vs. 8.2 indicating that the method of teaching efficiently decreased the difference in the individual learners and rendered the overall effect of learning more symmetrical. The margin of difference in the word matching section was comparatively lower, which indicated that the disparity between the two approaches was not so high at the basic memory stage as at the application stage, but the experimental group still had a 4.3-point advantage, and the point proves that the morphological analysis-based memory mechanism is more stable.

C. COMPARISON OF LONG-TERM RETENTION RATE AND APPLICATION CAPABILITY

Delayed test is conducted four weeks following immediate test; it is used to determine long term retention of vocabulary in the learners without further revision. The test material is of the same level as the immediate test except the questions are totally different and the test consists of the same three parts as in the word matching, sentence completion and short essay writing with a total mark of 100 marks. The retention rate is determined by dividing delayed test score with immediate test score. To ensure the validity of this comparison, the immediate and delayed tests were equated using a common-item design, with 20% anchor items shared between forms to maintain difficulty consistency. Furthermore, the parallel-form reliability coefficient (Pearson's r) was calculated at 0.86, and Cronbach's alpha for both versions exceeded 0.82, indicating high internal consistency and measurement equivalence between the two testing points. The vocabulary usage ability test is a test that is based on a separate task, where learners are expected to write a 300 words essay on a specific topic within a period of 30 minutes. The scoring tips are based on correctness, richness and proper use of vocabulary and the scoring is rated to 50 points.

TABLE 3. Comparison of Delay Test and Vocabulary Usage Ability

Test metrics	experimental group	control group	difference
Average score of delay test	79.6	53.5	26.1
retention rate	91.2%	73.5%	17.7%
Vocabulary usage test score	41.3	33.4	7.9
Improvement in application ability	-	-	23.7%
Forgetting rate	8.8%	26.5%	-17.7%

The data in table 3 indicates that the experimental group showed a major difference in terms of long term memory retention with a retention rate of 91.2%, having a difference of 17.7 percentage points with the control group and a forgetting rate of 8.8%. In the delayed test, the experimental group had a score of 79.6

points and the control group had a score of 53.5 points increasing the gap between them to 26.1 points meaning that the semantic network created through the root and affix association teaching technique has more stable memory. The experimental group scored 41.3 points in the vocabulary usage ability test, which is 23.7% more than the control group (the results of which came up to 22.1), which proves that the training of morphological analysis not only enhances memory but also develops the skills of flexibly using and perfectly expressing vocabulary in practice.

V. CONCLUSION

Grounded in constructivist theory, the paper suggests a root and affix association approach as an effective solution for Japanese vocabulary instruction tailored to the techni-

cal complexities of engineering. This method facilitates a deeper cognitive connection for learners navigating the specialized terminology essential to the industry. The approach assists students to develop isolated lexical symbols into interdependent knowledge unit by using three dimensions, which include the development of morphological analysis skills, semantic network building, and task-based practice, thereby transitioning from passive rote memorization to active meaning construction. According to the findings of the experiments, this method of teaching proves a lot of benefits in the sphere of the short-term learning performance, the long-term memory recollection, and the ability to use the received information in practice which proves that the teaching approach based on helping the learners to discover independently, the inner structure of the vocabulary, and make the multilevel semantic associations is conforming to the principles of the cognition. The weaknesses of this research are the small sample size and the fact that it was only confirmed to apply to the intermediate level learners; it is necessary to conduct a follow up on how it can be applied to learners at other different levels.

AUTHOR CONTRIBUTIONS

Li Mao designed, collected and analyzed the data, and drafted the manuscript. Li Mao conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Li Mao participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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HUMAN RESEARCH SUBJECTS

This study was approved by the Ethics Committee of North Minzu University, and was performed in accordance with the principles of the Declaration of Helsinki. All eligible participants signed an informed consent form.

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