

Study on Learning Style-based Computer-assisted Vocabulary Learning

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Abstract

Vocabulary learning is an on-going and life-long process, which is greatly influenced by individual differences. As one of the most outstanding individual differences, learning style largely determines learners' selection of learning strategies and thereby has a great effect on learning outcomes. Matching learning strategies with learning styles has a great potential in enhancing learning. Although individualized learning can hardly be realized in a classroom, it may be easily achieved by CALL. Therefore, responding to inefficient self-directed vocabulary learning of college students in Mainland China, this paper focuses on categorizing diversified vocabulary learning tasks which can activate various matched vocabulary learning strategies and integrating them into a learning system along particular learning paths to address different learning styles, i.e. visual, aural and logical. The efficacy of the learning system is also tested in an empirical study for the purpose of validating the effectiveness of these learning paths.

1. Introduction

Vocabulary learning is an on-going and life-long process and it is heavily influenced by individual differences. Students' individual differences refer to the differences in age, attitude, intelligence, language proficiency level, learning style and so on. These differences should be taken into account when teaching and learning process is planned. Nowadays, the differences in age and language proficiency level have been considered in plentiful textbooks or learning materials. However, the learning material catering for learning styles is hardly to be found, even though learning style is a relatively salient individual feature for its diversity among students.

Based on a few surveys [12, 21, 23, 24], college students in Mainland China depend too much on their teachers and are used to being passive recipients so that they seriously lack autonomy. The majority of those students engage mostly in rote memorization with word lists and decontextualized mechanical drills in self-directed vocabulary learning. In other words, they seldom learn words by selecting the tasks that address their learning styles. Such non-individualized learning can hardly realize effective use of vocabulary learning strategies or stimulate learners' interest and motivation. It is most likely to be one of the main reasons for frustration in self-directed vocabulary learning. Thus, it is of great value to develop a learning material which includes different learning paths catering for learners' different learning styles.

CALL, deriving from Computer-assisted Instruction (CAI), refers to "the search for and study of applications of the computer in language learning and teaching" [11]. From the 1990s up to the present, CALL has developed very rapidly with the great influence of constructivism. Based on this approach, the integrative phase of CALL is characterized by the use of multimedia, hypermedia and interactive technologies to promote integration of language learning skills. Although individualized learning can hardly be realized in a classroom, it may be easily achieved by CALL. This adaptive learning allows students to control their learning environment and select the options best suited for

their learning styles [7]. Therefore, an adaptive and intelligent learning system is hopefully developed in this research to address different learning styles. Vocabulary learning tasks will be categorized and integrated into a learning system along particular learning paths addressing different learning styles. It is supposed to enhance students' utilization of various vocabulary learning strategies, increase their interest and motivation, and create an effective individualized learning environment.

2. Literature review on learning styles

As one of the most outstanding individual differences, learning style largely determines learners' selection of learning strategies and thereby has a great influence on learning outcomes. It has been well defined by some researchers, such as “an individual's natural, habitual, and preferred ways of absorbing, processing, and retaining new information and skills” [18] and “Learning styles is how elements from basic stimuli in the current and past environment affect an individual's ability to absorb and retain information” [8]. Besides, different learning style models or inventories (Table 1) have also been built in the past few decades.

Table 1. Different learning style models or inventories

Models	Dimensions
Kolb (1984)	converger, diverger, assimilator, accommodator
Reid (1984)	visual, auditory, kinesthetic, tactile, group, individual
Felder and Silverman (1988)	sensing/intuitive, visual/verbal, inductive/deductive, active/reflective, sequential/global
Oxford (1993)	visual/auditory/hands-on, extroverted/introverted, intuitive/concrete-sequential, closure-oriented/open, global/analytical
Kinsella (1993)	visual/verbal, visual/nonverbal, auditory, tactile-kinesthetic
Memletics Learning Styles Inventory (2003)	visual, auditory, verbal, physical, logical, social, solitary

In addition, learning styles are general approaches to language learning, while learning strategies are specific techniques that learners select in their language learning [2]. With the great significance of learning strategies in language education and learner autonomy [1, 3, 5, 14, 22], it is important to create diversified and meaningful learning tasks, which can activate various learning strategies for learners' more effective language learning. Numerous studies [6, 13, 19, 20] reveal sufficient evidence in support of the strong relationship between learning styles and learning strategies. It is widely accepted that matching learning strategies with learning styles has a great potential in enhancing learning. Thus, the learning paths addressing different learning styles should be set up with the learning tasks activating various matched vocabulary learning strategies in the intended material, thereby improving self-directed vocabulary learning.

3. Development of a learning style-based vocabulary learning system

To cater for different learning styles, different learning paths indicating those styles have to be built in the intended system. However, it seems infeasible to address the learning styles in all dimensions from those models mentioned above. After careful selection, the Memletics Learning Styles Inventory was consequently taken as the main reference for this study because it was precisely defined, newly generated and widely accepted. Based on the inventory, a self-directed vocabulary learning system was ultimately developed, in which three learning paths addressing different learning styles, i.e. visual, aural and logical, were built up with the learning tasks activating matched vocabulary learning strategies for facilitation of students' effective utilization of various vocabulary learning strategies and improvement of self-directed vocabulary learning.

4. The Empirical study

4.1 Research question

An empirical study was conducted to discover whether the application of learning paths addressing different learning styles in computer-assisted vocabulary learning could significantly improve college students' self-directed vocabulary learning. Then, two kinds of computer-assisted learning environments had to be created so as to answer the question. They could be described as one where students used a vocabulary learning system embedding different learning paths with matched learning tasks (S1) and the other where students adopted a similar system displaying the same tasks without indicating any learning paths (S2). The research question was expectedly answered by the comparison between students' performances in the two learning environments after a certain period of time.

4.2 Participants

The participants in this study were 65 non-English major freshmen selected from a science and engineering university in Mainland China. They were divided into two groups and then assigned randomly to study on the self-directed vocabulary learning systems S1 and S2 respectively. No detectable differences were found in the English scores of the two groups in the examination immediately after college entrance and their achievements in the pre-test on target words.

4.3 Instruments

Three vocabulary tests, namely the pre-, post- and delayed tests were designated as the instruments for students' achievement comparisons. The participants were not informed in advance of the post-test immediately after the treatment and the delayed test two and a half months after the treatment. The test was mainly concerned with three essential aspects of the target vocabulary knowledge that the participants acquired in the intended systems, i.e. word form, word meaning and word usage.

4.4 Data collection and analytical methods

Three vocabulary tests above were carried out respectively in the two participating groups before, immediately after, and two and a half months after the treatment. Comparisons were made between the two groups based on their achievements in the three tests. Firstly, the gain scores between students' achievements in the pre-test and the post-test were compared by Independent samples t-test to clarify whether the gain scores of the group engaging in the system S1 were significantly higher than those of the group studying on the system S2 after the treatment. Secondly, the gain scores between students' achievements in the pre-test and the delayed test were compared by Independent samples t-test to unveil whether the students using the system S1 still achieved significantly higher gain scores than those taking the system S2 two and a half months after the treatment.

4.5 Results and discussion

Based on the data analyses, the group using the system which embedded different learning paths with matched leaning tasks (S1) achieved higher gain scores than that taking the system which displayed the same tasks without indicating any learning paths (S2) after the treatment. However, the Independent samples t-test value was insignificant at the default 5% level. It indicated that no detectable difference could be found between the gain scores in the two groups immediately after the

treatment. The result further implied that although the applications of learning paths that solely differentiated between the two systems above had a positive effect on students' achievements, the effect was not great enough to attain a significant difference.

Two and a half months after the treatment, the group utilizing the system S1 gained much more target word knowledge than that adopting the system S2. The Independent samples t-test value was insignificant at the default 5% level, but it was significant at the 10% level. Therefore, it could be said with 90% confidence that there was a detectable difference between the gain scores in the two groups two and a half months after the treatment. At the very least, a large difference was demonstrated. Meanwhile, we could state with 90% confidence that the application of learning paths as the only distinction between the two materials helped students achieve significantly more target word knowledge two and a half months after the treatment.

In addition, by comparison of the two sets of students' gain scores above, the growing mean differences and the declining significance levels revealed that the system S1 was more effective in helping to maintain students' long-term retention of target word knowledge than the system S2, i.e., the power of learning paths was enlarged two and a half months after the treatment. Thus, the positive effect of learning paths had evidently emerged.

5. Conclusion

Since individual differences have a great influence on vocabulary learning, the differences should be particularly emphasized while teaching and learning process is planned. Although learning paths indicating different ages and language proficiency levels have been taken into consideration in a number of learning materials nowadays, few materials are developed to cater for learners' different learning styles. With the rapid development of computer technology and its wide applications in language teaching and learning, individualized learning may be easily achieved by CALL, though it can hardly be realized in a classroom. Therefore, a self-directed vocabulary learning system was developed to particularly address students' different learning styles. In the system, three learning paths addressing learning styles, i.e. visual, aural and logical were set up to facilitate students' effective utilization of vocabulary learning strategies, improve self-directed vocabulary learning and achieve a favorable individualized learning environment.

In the empirical study, it was discovered that the system involving different learning paths with matched learning tasks was superior to that delivering the same tasks without indicating any learning paths in helping to achieve students' word retention as well as word transfer after the treatment, and a more significant advantage of the former was found two and a half months after the treatment. In other words, the application of learning paths attributed to the only difference between the two systems helped students gain more target word knowledge and more importantly retain more target word knowledge for longer time. Therefore, the efficacy of the developed self-directed vocabulary learning system was justified through the validation of effectiveness of the learning paths.

As limitations, if a longitudinal study can be conducted with a longer period of treatment on students, and more participants and a larger number of target words can be involved in this study, more impressive findings of computer-assisted self-directed vocabulary learning in different learning paths are most likely to be yielded.

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