Exploring Causal Relationships between Individual Differences and Web-Based Language Learning: A Structural Equation Modelling Approach

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Previous research on CALL indicated that effective activities pertaining to CALL enhanced learners’ motivation (e.g. Chang 2005; Fotos 2004). However, the effects of individual difference (ID) variables on the development of L2 proficiency through CALL have not been substantially investigated (Chapelle 2004). Further, the causal relationships between ID variables and improvement in L2 skills through CALL have been explored even less substantially. Within the framework of structural equation modelling, this study examined the causal relationships between four ID factors—motivation, learning strategies, instructional preferences, and attitudes towards Web-based learning—and the improvement in learners’ L2 reading proficiency through Web-based learning.

The study involved 135 Japanese college students who were enrolled in ‘Reading & Listening (R&L)’, one of the English classes offered at Rikkyo University, Tokyo. All of them were freshmen with a mean age of 18.4 (SD = .062). There were 91 female students and 44 male students; they were all placed in the advanced-level classes in our curriculum. Their bio data revealed that none of them had experienced any form of Web-based learning.

We developed online materials to improve learners’ L2 reading proficiency through the use of ‘phrase reading’—a ‘chunking’ or ‘word-combining’ strategy. While reading an English passage, Japanese learners of English are likely to mentally translate the English sentence into Japanese by converting the original English word order with the verb following the subject (e.g. SVO) into the Japanese word order with the verb in sentence-final position (e.g. SOV). This backward reading habit is considered to be one of the sources of the relatively slow reading speed of Japanese EFL learners. The phrase reading activities enable them to eliminate this poor reading habit in a way that forces them to process the English sentence phrase by phrase, one after another, without disrupting the original word order, for instantaneous comprehension of the meaning of each phrase. We decided to make such exercises available on the Web so that our students can access them at any time and place.

Based on previous research on ID, questionnaires were developed to elicit the factors influencing motivation, learning strategies, and instructional preferences. Additionally, a questionnaire related to Web-based phrase reading exercises and designed to elicit factors behind the attitudes towards Web-based learning, was also constructed. This questionnaire also provided information, in the form of self-evaluations, on the extent to which learners were able to develop their L2 reading skills through our Web-based materials.

Data were collected during the spring semester of 2004 and 2005 from the researcher’s R&L classes. The participants were instructed to read the materials outside the class during the course of the semester. Towards the end of the semester, they filled in questionnaires on the four ID factors and the perceived improvement in L2 reading proficiency brought about by using the materials.

The exploratory and confirmatory factor analyses yielded four latent variables for motivation, three for learning strategies, two for instructional preferences, and one for attitudes towards Web-based learning. We hypothesized that the ten latent ID variables are directly and/or indirectly related to the criterion measure ‘Improvement in L2 Reading’. This hypothesized model was tested using AMOS 7.0.

A moderately good fit to the data (RMSEA = .069) was revealed in the final structural model, and twelve paths—two of which were data-driven paths—were found to be statistically significant. Five remarkable findings emerged from this model. First, of the ten latent ID variables, only the motivation variable ‘Course Orientation’ was found to be capable of significantly predicting learners’ improvement in L2 reading using our Web materials (β = .542, p < .001). Second, this particular motivation variable was also found to predict learners’ attitudes towards Web-based learning (β = .524, p < .001). Third, attitudes towards Web-based learning did not predict the improvement in L2 reading on the Web. Fourth, this attitudinal variable was directly associated with the instructional preferences variable ‘Challenge’ (β = .205, p < .01)—a data-driven path recommended by AMOS. Fifth, there were no indirect paths leading to the improvement in L2 reading.

The significant contribution of the Course Orientation motivation indicates the possibility that learners who are satisfied with the content of this course (R&L) and recognize the importance of learning the course materials, irrespective of the formats, are able to improve their reading skills using our Web-based materials. Further, learners who tend to believe that what they learn in this course would help them in other English courses and would take this course even if it were not required, would improve their reading proficiency (and overall proficiency) through our Web materials. In fact, at the beginning of the semester, we emphasized that the goal of the course is to improve reading and listening skills that would enable learners to obtain good learning outcomes in the other courses in our English curriculum. This finding is contradictory to Warden and Lin’s (2000) argument that ‘required motivation’—a motivation to study because the class was required—is necessary for Asian students to yield
positive learning outcomes. Moreover, it is plausible that learners with this motivational disposition exhibit positive attitudes towards the Web-based learning system that encourages them to learn English at their own pace. However, this attitudinal variable is not directly associated with the criterion measure, suggesting that mere encouragement through a new form of learning may not be enough to lead learners to higher learning outcomes.

The data-driven path in the current structural model also indicates that the learners with more positive attitudes towards Web-based learning tend to engage in more challenging activities both in and outside the class. This suggests that cultivating a positive attitude towards Web-based learning in one way or another—for instance, by developing more effective Web materials—would strengthen learners' preferences for more challenging activities, possibly resulting in a substantial improvement of their L2 skills. The development of more effective Web materials such as those outlined herein should thus be greatly encouraged, and the replication of the current design should be implemented using a different population in future research.


