Title	Effect of Applying Color-Coding Technique to Different Leaning Methods on the Acquisition of Grammatical Gender in the German Language
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Abstract

As all parts of the world being brought together by the internet and other electronic communication interconnections, people are exposed to more options and possibilities. To seize the opportunities, many of them make their first step by starting to learn a new language. Being the official language of Germany and Switzerland as ones of the top developed countries, the German language appears on the to-learn list of many dream finders. However, one of the most important features in German language, the *grammatical gender system*, has stopped many adventurers from continuing the journey of learning. This system continues to pose a challenge to second language learners.

To support the L2 learners to learn the target language in a more effective way, color-coding technique has been applied to the learning/teaching materials as a useful visual enhancement. In the case of Germen language, this technique has been particularly applied to the improvement of acquisition of grammatical gender. Based on the possessing grammatical gender, blue is assigned to masculine nouns; red is assigned to feminine nouns; and green is assigned to neuter nouns.

In this research, we modified the existing color-coding technique combining with three learning techniques, which were wordlist, writing and drawing, to enhance the effectiveness of learning the grammatical genders for German nouns. As implementation of the three methods, the learning materials for learning vocabulary using the three methods were created on PowerPoint and were later used in the learning process.

The study was carried out with 24 graduate/undergraduate students differing in backgrounds, majors but having no experience in learning German language. Since the experiment was conducted in English, the participants were able to speak basic level of English. The learning process in the experiment was divided into three sections, where the participants were asked to learn the target words in three different word packages with the three tested learning method respectively. To be precise, the participants learnt one of the word packages in each learning section with one of the tested methods, i.e., color-coded wordlist, color-coded writing, and color-coded drawing. All participant completed the learning process, leaning 12 German nouns with color-coded wordlist material; 12 German nouns with color-coded writing material; and 12 German nouns with color-coded drawing material. Keeping in mind that an order effect could occur in within-subjects design, counterbalancing was used as a solution to reduce the effect so that the participants were designed to apply the method in different order. After the learning process, an immediate posttest, following with the first survey, was given to the participants. Two days later, an email with two links for a delayed posttest and the second survey was sent to all participants.

To evaluate the effectiveness of the three tested methods, we compared the mean score of learning of grammatical gender on both the immediate posttest and the delayed posttest, using repeated-measures ANOVA test, which is for analyzing data where same subjects are measured more than once, to find out whether a significant difference could be found. The ANOVA tests were conducted in R and the results were visualized using different types of charts. Results from the analyses showed that there was a statistically significant difference between three conditions on both posttests, with the highest mean score in color-coded drawing condition. Observing the responses in the second survey, over 90 percents of the participants showed their preference for the color-coded drawing over the other two methods, while two third of the participants considered this method to the most useful method for leaning German nouns.

In conclusion, color-coded drawing method proves its worth by providing a more interesting learning environment and supporting the learners to learn the grammatical gender for German nouns in an effective way. Learning German nouns with color-coded drawing method, a strong impression of the color-coded illustration is given to the learners, which enable them to recall the color assigned and the meaning of a German noun days later. Nevertheless, the materials utilizing the combination of color-coding technique and drawing method are yet imperfect. A balance between drawing tasks and vocabulary learning should be taken into consideration. Several limitations, such as time constraints, imperfection of the color-coded drawing method and difficulty of implementation, are discussed, and suggestions are given to the future researchers. This paper suggests that color-coded drawing is an effective and promising method for the German as second language learners to learn grammatical gender along with the vocabulary.