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Title	外国語教育における創造性の育成と評価：連想を用いた活動とバイオメトリックデータ分析
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Abstract

Cultivating students' creativity has become an important part of teaching foreign languages at the university level. This study proposed a creative pedagogy for the foreign language classroom. Activities that involve association and mind mapping in a student-centered mode can encourage students to think creatively. This study implemented association-based activities with mind mapping to encourage students to exercise creative, divergent thinking in their learning process. The setting for the study was a school of Japanese studies at a university in Dalian city in China. At this university, the students generally follow a traditional curriculum, which is unconcerned with improving creativity. The fundamental aim was to explore whether a creative pedagogy could effectively promote creativity development in students' creative thinking skills, language proficiency, and learning motivation. The experimental group received an 8-week intervention that combined the regular curriculum with association-based activities with mind mapping. The control group received the regular curriculum. It assumed that association-based activities with mind mapping positively impact the cultivation of creativity.

At present, few studies have investigated to what extent association-based activities influence foreign language learning among university students in terms of creativity outcomes. To clarify the effect of the association-based activities on creativity, we employed an experimental methodology involving a pre-test/post-test repeated measures design. All students were tested on creativity performance using three assessment instruments, a creative thinking test, a foreign language proficiency test, and a motivation questionnaire: evaluating creative thinking skills through creative thinking test, performance rating by three factors of fluency, flexibility, and originality; assessing Japanese language proficiency through Japanese-language proficiency test, in terms of vocabulary, reading comprehension, and writing; administering a motivation questionnaire, including choice, executive, and increased motivation questionnaire, to assess students' learning motivation.

Besides using traditional tests to measure students' creativity outcomes, an electroencephalography (EEG) investigation was taken for testing students' divergent thinking skills, and an eye tracking analysis was taken for assessing students' Japanese language proficiency, which provided biometric data to further verify the effectiveness

of creative pedagogy. In recent years, with the rise and development of cognitive neuroscience, the research techniques of EEG and brain function imaging have provided powerful research tools for directly observing the activity of the brain when processing complex information, which provides a more direct method for exploring the brain mechanism of creative thinking, especially divergent thinking. In this study, the EEG data of the two groups students were compared and analyzed during the divergent thinking tasks' process. It's expected that the findings will deepen understanding and promote the study of the effectiveness of creative thinking skills. In addition, this study used eye tracking sensors to explore creative pedagogy's effects on reading ability that is regarded to be the comprehensive reflection of foreign language proficiency. Eye tracking sensors was used to record eye movement indicators in real time, going on to map the eye movement indicators to the reading process that can effectively analyze the reading ability, which provides a quantitative assessment and data evidence of creative pedagogy's effectiveness on students' language proficiency.

In summary, the findings in this study suggest that association-based activities could be taken into consideration when cultivating creativity in foreign language teaching in university. Data and insights culled from the findings in this study establish the knowledge framework of creative foreign language teaching methods and evaluation, which will contribute to the knowledge science to set future directions for the creative pedagogy in the field of foreign language teaching and learning in undergraduate education.

Keywords: creativity; association-based activities; creative thinking skills; foreign language proficiency; learning motivation