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| Title | デジタルデバイスを用いた学習効果は紙とインクペンに匹敵するのか —N400脳波を用いた検討— |
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論文内容の要旨

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| 氏名 (大杉 清之) | |
| 論文題名 | Is the learning effect using digital devices comparable to paper and ink pens? —Study using N400 electroencephalogram— (デジタルデバイスを用いた学習効果は紙とインクペンに匹敵するのか —N400脳波を用いた検討—) |
| 論文内容の要旨 | |
| <p>The introduction of digital devices is progressing along with the digitization of educational scene in recent years. In this study, I investigated the learning effect by using them. I compared the learning effects using an analog pen and a digital pen for two linguistic learning tasks, which were learning Kanji characters and learning Indonesian, within 1 hour. In addition, in order to examine the effect of proficiency of digital pen on learning, the participants were divided into two groups, a digital pen proficiency group and a digital pen beginner group. I investigated the number of memorized words, the performance of the correct/incorrect judgment task, and the N400 component, which is an electroencephalogram component generated during the correct/incorrect judgment task and thought to reflect the latent progress of linguistic learning. The number of memorized words and the performance of the correct/incorrect judgment task for learning Kanji characters were significantly higher than those for learning Indonesian. Similarly, the amplitude of N400 for learning Kanji characters was significantly larger than that for learning Indonesian. Moreover, the amplitude of N400 of the participants who were able to remember more words tended to be larger. These results indicated that the N400 was able to measure the effects of learning, even if it took only 10 minutes of learning. Furthermore, it was clarified that the same learning effect as the ink pen can be obtained with the digital pen regardless of the proficiency level. However, the N400 repetition effect learned with the digital pen was significantly higher than that learned with the ink pen in the digital pen proficiency group. On the other hand, this difference was not observed in the digital pen beginner group. This indicates that learning is more effective when the digital pen is used after the user has mastered the use of the digital pen.</p> | |

論文審査の結果の要旨及び担当者

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論文審査の結果の要旨

教育の現場にもデジタル化の波が押し寄せている。従来の紙とインクペンの代わりにタブレット端末とデジタルペンを使っても、学習効果に影響はないのだろうか。大杉さんはこの点を明らかにするために、漢字の書き取りとインドネシア語の語彙の習得、という2つの課題の学習効果について、紙とインクペンを用いた場合とタブレットとデジタルペンを用いた場合を比較した。デジタルペンへの習熟度が学習に与える効果を探るため、デジタルペン初心者と習熟者の2群を設定した。学習効果は試験の得点に加えて、潜在的な学習効果を反映するとされる脳波のN400成分の変化を指標として用いた。その結果、デジタルペンでも、習熟度に依らず、インクペンと同等の学習効果を得られることが明らかになった。しかし、デジタルペン習熟に伴い、インクペンの潜在的な学習効果が有意に低下していた。デジタルデバイスによる学習の有効性を示す一方、デジタルペンを使い始めたら、インクペンには戻れない可能性を示した本研究の成果は、教育のデジタル化について注意を促す社会的にも意義のある成果を挙げたものであり、博士の学位を授与するに値するものと認める。なお、チェックツール“iThenticate”を使用し、剽窃、引用漏れ、二重投稿等のチェックを終えていることを申し添えます。