



## J25 Writer's Cramp and Technology: Its Influence on Intra-Writer Handwriting Variability

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**Learning Overview:** After attending this presentation, attendees will have learned about writer's cramp, how technology is influencing handwriting and causing an increase in writer's cramp, and how writer's cramp influences handwriting when evaluating variance and dysfluency in forensic handwriting examination cases.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by presenting data about conditions that adversely affect handwriting fluency and increase intra-writer handwriting variability.

Forensic handwriting examiners evaluate handwriting fluency and range of variation to make determinations about handwriting identification. The spasmodic and temporary conditions caused by writer's cramp create a seizure in the hand muscles that control handwriting coordination, thereby retarding handwriting fluency. Such conditions need to be carefully evaluated and researched in order to differentiate them from the dysfluency that is sometimes present in handwriting simulation and other conditions.

Recent research has shown that with the increased use of hand-held technology, such as cell phones, there has been a corresponding increase in musculoskeletal disorders, including writer's cramp. Studies have shown that Cumulative Trauma Disorders (CTDs) and texting tendinitis are present among those who use hand-held technology devices on a continuous basis. While writer's cramp can be a problem for writers of all ages, historically it has tended to have an onset in adults around the age of 40. Research data is relatively limited about the prevalence of writer's cramp among younger adults.

The aims of this study are to show the connection between use of technology and the increase in writer's cramp among college students and how the writer's cramp deteriorates and increases intra-writer handwriting variability. In the study, 54 college students (mean age 21.6; median age 20) answered a questionnaire about personal technology use and whether their hands cramped. Each student wrote a pre-test sentence in handwriting and hand printing and a signature before completing a test in a criminal law class that required continuous handwritten responses. The time each student spent on the test was recorded, which ranged between 40–86 minutes. Average test writing time was 71 minutes. After the test, the students completed a second questionnaire that included handwriting and hand printing a post-test sentence and signature and answering a question about whether their hand cramped during the test.

The handwriting samples were evaluated for changes in handwriting before and after the test and were categorized into three groups: severe, moderate, and slight/no change in handwriting. Evaluation of the samples showed that 42 of the 54 students (77%) exhibited moderate to severe deterioration in handwriting between pre- and post-test. Changes in the handwriting between pre- and post-test samples included tremor, size, alignment, slant, proportion, and other factors. Among the 42 students, 39 stated they experienced writer's cramp during the test. Participants in the survey complained of pain, fingers "locking up," spasming, and burning sensations during the test. Students were observed massaging their hands during the test and some students stated that their hands were not working. On average, the 42 students showing moderate to severe handwriting deterioration reported that they spent over four hours a day using their cell phones.

Results of this study show that there is evidence of early onset of writer's cramp among college students. Results support prior research showing that the decline in using and teaching handwriting coupled with the increased use in hand-held technology has caused a deterioration in handwriting and a corresponding increase in writer's cramp and intra-writer handwriting variability.

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**Forensic Handwriting Examination, Handwriting Variation, Writer's Cramp**