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# Handwriting and Metacognition: The Relationship Between Self-Reflection and Penmanship

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# Handwriting & Metacognition

## The Relationship Between Penmanship & Self-Reflection



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### Introduction

Handwriting difficulties affect 10-34% of school-aged children and can have long lasting negative outcomes (Feder & Majnemer, 2007; Rosenblum et al., 2010). Occupational therapy interventions have been shown to be effective in remediating handwriting difficulties, yet there is little research pinpointing which specific skills associated with handwriting are most salient. Although not well studied, metacognitive ability appears to have a positive impact on academic success. Self-reflection, an element of metacognition is worthy of attention and may be an influential component of handwriting proficiency. Interventions derived from metacognitive strategies may have a positive effect on the remediation of handwriting. Due to the undetermined link between self-reflective ability and handwriting skill, more research should be dedicated to investigating this relationship.

### BACKGROUND

#### Handwriting

- ▶ Even in the digital age, handwriting skill remains an essential educational tool for school age children and significantly influences academic success, self-esteem, and learning.
- ▶ Better handwriting skill (improved legibility, speed, and automaticity) leads to better academic achievement (National Handwriting Institute, 2014).
- ▶ Poor handwriting can influence perceptions about a child's writing competence and intelligence (Feder & Majnemer, 2007; Graham et al., 2000).
- ▶ Handwriting supports healthy brain development (James, 2010; James & Atwood, 2009).

#### Metacognition & Self Reflection

- ▶ Metacognition is the awareness of one's own thought processes.
- ▶ Self-reflection, an essential component of metacognition, is the ability to evaluate one's performance, attribute significance and inferences to the results, and develop conclusions about how one needs to alter his/her approach during subsequent efforts to learn and perform (Zeidner, Pintrich, & Boekaerts, 2005).
- ▶ Metacognitive skills begin to develop in preschool and continue to improve throughout the lifespan (Germeroth, 2013).
- ▶ Students with well-established metacognitive abilities are:
  - More successful during academic tasks and more adept at achieving academic goals (Fleming, 2014)
  - Better able to monitor thoughts and ideations during reading and writing tasks (Griffith & Ruan, 2007)

#### Occupational Therapy Intervention

- ▶ Handwriting difficulties account for the majority of referrals for school based OT intervention (Schneck & Amundson, 2010).
- ▶ Occupational therapy interventions have been shown to be effective in improving handwriting deficits (Denton, Cope, & Moser, 2006; Peterson & Nelson, 2003).
- ▶ Cognitive interventions, and in particular metacognitive strategies have shown to be successful in the remediation of handwriting, yet it remains unclear which aspects of cognition and intervention are integral to handwriting skill (Weintraub et al., 2009; Zwicker & Hadwin, 2009).

### Objective

The focus of this study was to examine the relationship between self-reflective ability and handwriting skill in second graders. This study hypothesized that effective self-reflection is a necessary skill for handwriting competency.

### Methods

**Research Design:** Exploratory correlational

**Setting:** The Friends School in San Francisco, CA & Bacich Elementary School in Kentfield, CA

**Participants:** 74 typically developing second grade students between the ages of seven and eight years eleven months

**Data Collection Procedures:**

- Individual and small group in-class testing
- Parent/guardian background questionnaire and teacher questionnaire

**Data Analysis:** Descriptive Statistics and Pearson Correlation Coefficients (SPSS Version 22.0)

### Assessment Measures

- ▶ **Minnesota Handwriting Assessment (MHA):** Tests speed and quality of printing. Scores include: legibility, form, alignment, size and spacing. Norm referenced for 1<sup>st</sup> and 2<sup>nd</sup> graders.
- ▶ **Here's How I Write (HHIW):** Examines a child's perception of their own handwriting skills. Consists of a picture card interview with 24 cards illustrating various aspects of handwriting including: feelings about handwriting, handwriting performance, and physical factors. Criterion referenced for 2<sup>nd</sup> through 5<sup>th</sup> graders.

### RESULTS

| Sample Demographics    |      | Metacognition & Handwriting Scores  |       |       |
|------------------------|------|---|-------|-------|
| Characteristic         | (%)  | Variable  | Mean  | SD    |
| Gender                 |      | MHA Score   | 83.9  | 11.68 |
| Male                   | 45.9 | HHIW Score  | 66.28 | 21.4  |
| Female                 | 54.1 | Scores are out of 100; higher scores are indicative of higher performance; SD = standard deviation; HHIW (Here's How I Write) was used to measure metacognition; MHA (Minnesota Handwriting Assessment) was used to measure handwriting ability |       |       |
| Parent Education Level |      |   |       |       |
| Parent with UGD        | 30   |   |       |       |
| Parent with GD         | 60   |   |       |       |
| Other                  | 10   |   |       |       |

n=74; UGD = undergraduate degree; GD = graduate degree

### Discussion

Data analysis did not reveal statistically significant correlations between MHA scores and HHIW scores.

Limitations of the study that may have impacted results include:

- ▶ **Metacognitive & self-reflective skill development:** These skills may not have been markedly developed at the second grade level.
- ▶ **Suitability of assessments:**
  - **MHA:** Data analysis revealed high overall scores, and limited variability, indicating that the student skill level surpassed the difficulty level of this handwriting assessment.
  - **HHIW:** Scores indicated insight into students' feelings and perceptions towards handwriting, but did not adequately capture self-reflective ability in relation to specific handwriting skills.
- ▶ **Influence of group setting:** Although the HHIW assessment may be administered to a group, this approach appeared to skew the children's answers.
- ▶ **HHIW teacher report & inconsistencies:** Due to limited time and guidance, teachers may not have carefully enough reported student skill level on the questionnaire.
- ▶ **Socioeconomic status of participants:** The participating schools were in high socioeconomic regions and 90% of the parents possess a Bachelor's degree or higher. Parents might place more emphasis on their child's education and have means to help their child if they struggle with handwriting.
- ▶ **Complexity of handwriting:** Handwriting involves complex motor and mental processes, making it difficult to assess which components were influenced by the many facets of metacognition. Due to the lack of assessments for metacognition, it was difficult to determine the relationship between metacognitive skills and handwriting for second graders.

### RECOMMENDATIONS

- ▶ Additional research examining the link between the ability to self-reflect and handwriting skill is recommended.
- ▶ Future research should focus on identifying and isolating each of the factors that contribute to effective handwriting instruction, including metacognitive strategies.
- ▶ Development of assessment tools designed to measure metacognition and self-reflection is advised.
- ▶ Experimental research is recommended so the contribution of self reflective ability to handwriting skill can be more effectively examined.
- ▶ Future studies would benefit from a larger and more diverse sample with children from various socioeconomic backgrounds.