Literature Review

Keri Rice

Eastern Kentucky University
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Handwriting has been an important part of society and education for many centuries and is something that all children entering school must learn. Even before becoming school aged, children spend most of their time coloring, scribbling and then eventually begin writing. Handwriting is now being introduced to children at a young age and is still important in spite of the increasing use of computers. Burns (1962) stated, “The ultimate purpose of handwriting is to express and communicate meaning” (p. 3).

Literature to complete this review was obtained from online databases using EBSCOHOST and Education Research Information Center (ERIC). The databases included Academic Search Premier and CINAHL. Google Scholar was also utilized to search for handwriting articles. Keywords for locating literature included pencils, writing instruments, pencil size, pencil shape, handwriting, and handwriting performance. The bound periodicals of the Crabbe Library at Eastern Kentucky University were also utilized.

According to Amundson (2005),

Occupational therapy practitioners view the occupation of children to be activities of daily living, education, work, play, and social participation. In the area of education, school-aged children’s occupations encompass academic tasks, such as reading, writing, calculation, and problem-solving as well as non-academic or functional ones (p.587).

One common academic activity is writing. Writing is a complex process that is used in every day life and one that consumes most of the student’s school day. According to Pape and Ryba (2004), students spend one-third to one-half of the school day engaged in
pencil and paper activities. Occupational therapists are requested to evaluate a student’s handwriting, when it interferes with the student’s performance. According to Amundson (2005), the role of the occupational therapist is to look at the interaction of the student, the environment and the demands of the school occupations.

Different aspects of handwriting are studied since handwriting plays a major role in nearly all students’ educational experience and/or everyday life. Kiss (2007) emphasized legible handwriting is a very important skill in a student’s life. This includes attaining proficiency in school work to the mandatory written part of the SAT Reasoning Test. Educational work that is written with good penmanship will be scored higher than work with poor penmanship (Chase, 1986).

One question that has been explored since the 1940’s is the size of the writing instrument and its affect on a child’s handwriting. Researchers have explored the size and shape of the pencil to see if it had an impact on children’s handwriting. As stated by Burns (1962), “… some understanding of the types and uses of materials available for teachers and pupils is worthwhile” (p. 54).

In most elementary schools it is common that children use large beginner’s pencils as their first writing instruments. This type of pencil has been used with the argument that children are still developing their finger-hand-arm coordination and this type of pencil is better suited for their development (Herrick, 1961). It is also used because it is believed that children are still in the large-muscle stage and therefore the larger writing instruments are easier for them to grip (Herrick). When compared to a regular pencil one can see that the lead in the primary or beginners pencil is larger, as is the overall diameter of the regular pencil. Supporters of the primary pencils contend that
the larger diameter aids in correct finger position, while discouraging unnecessary finger movement and reduces cramping while being easier for the young student to manipulate (Graham, 1992). According to Krzesni (1971), “Educators have rationalized giving their children these tools by saying that children lack control of fine muscular coordination and thus must use large diameter pencils... to develop their larger muscles of the arm” (p. 821).

Oehler et al. (2000) explained that during the 1920’s the large diameter pencils appeared in the school supply houses because it was believed they were easier for the pupils to control and they encouraged appropriate grips. By the 1980’s the large diameter pencils were commonly used in primary and kindergarten classes.

Tafford and Nelson (as cited in Oehler et al. 2000) suggested two possible reasons for students to use large diameter pencils. One is that the larger lead moves easier over the paper. The second reason is that the large diameter of the pencil will separate the muscles in the hand, which will aid in more motion. Boardman (as cited in Oehler et al. 2000) stated that using a larger diameter pencil will aid in the pencil slipping out of the student’s hand less frequently and help in the development of better finger control and strength. Benbow (1987) suggested that the size and shape of the pencil affects the type of grasp the student has, which in return affects the quality of handwriting.

Burns (1962) reported that teachers preferred a large diameter pencil for beginners although students were starting to use standard size pencils with a larger, softer lead. He stated that some teachers believed that pencil size had a slight effect on handwriting achievement and the physical reactions of the student.
As stated by Schneck (1991), “Grip is important because it allows the fine movements necessary for writing” (p. 701). Schneck explained that the grip and motor responses required for handwriting become automatic for some children, while many children struggle with handwriting and the skills involved. When describing the tripod grip, one of several typical grips, Ziviani & Elkens (1986) noted that “One factor that is claimed to influence handwriting is the development of a “dynamic tripod grip” which employs the thumb, index and middle finger in a coordinated fashion to manipulate the writing instrument” (p. 248).

Tseng & Cermak (1993) stated that the dynamic tripod grip is encouraged by teachers and therapists; however there are variations of grips. Rosenbloom & Horton (1971) found that pencil grip developed in three stages. These stages included a palmar grasp, a static tripod grasp and a dynamic tripod grasp. Ziviani (1983) suggested that there is developmental progression for pencil grip that continues for the child until about 10.5 years old. According to Kamm, Thelen & Jensen (as cited in Yakimishyn & Magill-Evans 2002), the grasp used reflects the interaction of components of the organism with components of the environment and the task. Grip of the writing instrument is important because it does affect or influence the type/shape of the writing instrument that is being used.

Herrick (1961) acknowledged that teachers ask questions about the significance of using one writing instrument over another. Some of their questions concerned the length, thickness and the shape of the writing instrument. Herrick stated:

Unfortunately, the role of the writing instrument has not been considered a very important one in educational research, and little real educational and
psychological knowledge exist as a basis for designing an effective instrument for children to use as they learn to write. Most of our design knowledge relates to production and sales- not to the instrument as an educational tool (p. 49).

Wiles (1943) discussed the need to have objective evidence concerning the merits of various sizes of pencils since pupils are using handwriting instruments to complete school work. Greer and Lockman (1998) stated, “One of the most striking advances in motor skill in the preschool years is the development of handwriting” (p. 888).

Coles and Goodman (1980) explored why large writing instruments were being used and the research that supported the use of these instruments. Coles and Goodman stated, “This common practice raises several questions for researchers and teachers who are interested in the composing process of young children” (p. 194). One of the questions included, is a child’s composing enhanced or interfered with by the special materials used in primary grades? Coles and Goodman (1980) stated:

A historical investigation of these questions revealed: 1) There are very few sources when compared to other aspects of handwriting; 2) there is a disagreement among authors; 3) there is a lack of empirical evidence to support many recommendations about the use of special writing implements… (p. 194).

It has been common to offer beginning writers large tools such as the primary pencil to take into account the child’s lack of fine muscular coordination and to encourage movement of arm muscles rather than the fingers alone (Wiles, 1943). This is done in the hope that fatigue in the child will be lessened. Wiles completed research looking at the tools first graders were using (n = 833). He controlled the pencil diameters
which were 7.4, 8.6 and 9.8 millimeters. The children were divided into nine pre-
arranged groups and assigned a combination of writing tools that they used throughout 
the year. Three tests were administered throughout the year to measure the child’s 
achievement. The results of the study showed that the size of the writing tools had little 
effect on handwriting achievement or the physical reactions accompanying handwriting.

Lamme and Ayris (1983) explored the effects of various writing tools on the 
handwriting of first-grade children. Five writing tools were randomly assigned to 35 first 
grade classrooms. The tools included a large primary pencil, standard #2 pencils with 
triangular grips attached, Zaner-Bloser small primary pencils and Bic fine felt-tip pens. 
The samples were obtained for analysis of legibility one week prior to the end of the 
semester. The findings show, “there were not significant differences in the legibility of 
the different tool groups” (p. 33). “There were however, significant classrooms 
differences within each tool group (p. 33). The study did show that when given a choice 
the students preferred the felt-tip pens over the #2 pencils.

Current research has also been conducted to determine if the writing instrument’s 
shape or size impacted the child’s writing skills. The results of this research are similar 
to previously conducted research.

Oehler et al. (2000) conducted a study that looked at the effect of the pencil size 
and shape on the writing skills of children in kindergarten. The sample consisted of 126 
five and six year olds. The children’s writing skills were tested while using three 
different writing tools that consisted of standard black #2 round pencil, a primary black 
#2 7/8 cm round pencil and a #2 primary pink 7/8 cm triangular shaped pencil. The
outcome of the study indicated that the size or shape of the pencil did not have an impact on the quality of the writing the children produced.

In a study conducted by Carlson & Cunningham (1990), forty-eight preschool children were observed using a regular pencil as well as a primary pencil. The study found that the quality of the student’s writing, their finger position and movement and pencil control were not affected by using the primary pencil. The results of the study did not identify one pencil as being better suited for writing than the other. During this study some of the student’s writing performance increased with the use of the regular pencil while other student’s performance increased with the use of the primary pencil.

The results of a study conducted by Readdick (1994) showed that there was no difference between the use of primary and standard markers, pencils and crayons. For this study twenty children, ranging from age two through six were observed performing freestyle drawing using markers, pencils and crayons, individually in a single session within their homes.

Tawney (1967) felt, “The ball point pen is too ubiquitous to be ignored” (p. 59). This author explained that handwriting is a tool and that it is only reasonable to teach children to write well with the instruments that they will be using. This led to a study of four first-grade classrooms, which were using ball point pens. The ball point pen was between the diameter of the normal pencil and the one-half inch diameter of the larger diameter primary pencil. The sixty six students were divided into two groups, one using the ball point pen and the other using the primary pencil and a beginning handwriting instrument. During the school year the handwriting test were administered five times.
The results of the study indicated that the performance of the students using the ball point pen was significantly better than the students using the pencil.

The results of a study conducted by Joseph Krzesni (1971) confirmed the findings of Tawney (1967), who found the primary graders performed better with ball point pens. In Krzesni’s study, 120 third graders were given felt and ballpoint pens and normal diameter pencils. This study was important because it showed that the third graders who were using pencils increased the quality of their performance by up to 33% when they used ball point or felt pens.

As stated by Amundson (2005), “The type of writing instruments children use in the classroom also warrants considerations” (p. 604). Amundson suggests that children be allowed to choose among a variety of writing tools. She proposed that parents and teachers help the child determine which writing instrument is the most comfortable and efficient for them. Graham (1992) supported recommendations as made by Coles and Goodman when he suggested that students have a variety of writing instruments available for their use. He stated that it may be unnecessarily restrictive to ask students to use one type of writing instrument while at school, since many students are using a variety of writing instruments while at home.

Although numerous beliefs were presented regarding the possible benefits of larger writing instruments during this investigation of the literature, the research reviewed demonstrated the size of the writing instrument does not have an effect on the student’s writing performance. The majority of the evidence found focusing on the size of the writing instruments is dated back to the mid to late 1900’s. There appears to be a limited
amount of current research assessing the effect of the size and shape of writing instruments on student’s handwriting performance.

References


Does the diameter/shape of the writing utensil effect handwriting skills?

Past research that focused on the size of writing instruments was more prevalent from the 1940’s until the 1980’s. During this period most results indicated there was no difference in the quality of handwriting related to the writing instrument’s size.

Current research includes:

- A limited amount of research has been conducted to explore the effects of pencil shape on handwriting. (Oehler, DeKrey, Eadry, Fogo, Lewis, Maher, & Schilling 2000)
• The majority of the research available on the effect of pencil size is outdated and contradictory (Carlson & Cunningham 1990)

• Researchers feel that there is a lack of evidence relating to use of triangular shaped pencils and the continued use of primary pencils. (Oehler, DeKrey, Eadry, Fogo, Lewis, Maher, & Schilling 2000)

• It is suggested that the size and shape of the pencil affects the type of grasp the student has, which in turn affects the quality of handwriting. (Benbow (1987)

• Current researchers suggest that using larger diameter pencils will:
  - Separate the muscles on the hands which allow the child more motion
    (Tafford & Nelson - As cited in Oehler et al. 2000)
  - Aid in children developing their finger-hand-arm coordination (Herrick, 1961).
  - Aid in correct finger position, while discouraging unnecessary finger movement and reduce cramping while being easier for the young student to manipulate. (Graham 1992)
  - Support and allow for less slippage of the pencil (Boardman –As cited in Oehler et al. 2000)

Based on the research, the diameter/shape of the writing instrument does not impact the writing performance of the students. (Lamme and Ayris’s 1983, Oehler et al 2000, Carlson & Cunningham 1990, Readdick 1994) However, some studies did find that student’s writing performance improves while using a ball point pen instead of a pencil. (Tawney 1967, Krzesni 1971)
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