An Analysis of Handwriting and Technology-Based Activities in the Elementary School Classroom

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Abstract

Background: In typically developing children, fine motor skills are acquired in a sequential manner (Maldarelli et al., 2015). Previous studies examined fine motor and paper-pencil activities among others to reflect the elementary school classrooms. However, inconsistencies were found in the time spent in these activities. Previous research does not always reflect newer aspects of today's classrooms involving technology use and other activities.

Objective: The purpose of this study was to identify and compare the types of writing readiness, traditional handwriting, and technology-based activities as well as time spent in these activities in kindergarten through fifth grade classrooms.

Methods: In this descriptive study, data was collected regarding the types of activities conducted and time spent in these activities in elementary school classrooms in grades kindergarten through fifth grade. A data collection form was utilized to record the time and types of activities observed. Activities were then categorized into four categories: writing readiness, traditional handwriting, technology-based activities, and other.

Results: Examples of activities that fell within the four categories were: "coloring" for writing readiness, "paper and pencil tests" for traditional handwriting, "typing on a laptop" for technology-based, and "recess" for other. When comparing the amount of time spent in each of the four categories, data revealed that among all classrooms observed, most of the day, 23%, was spent participating in traditional handwriting activities. Time allocated to technology-based activities was 14% and writing readiness activities was 8%. The largest portion of the day for all classrooms was spent in activities categorized under other, totaling 55%.

Conclusion: This study provides updated evidence regarding activities reflecting today's elementary school classrooms. Findings indicate a steady decline in handwriting activities, and technology use was the same in the classroom when compared to previous studies. Practitioners can utilize this information to better provide services for elementary school children.

Introduction

In typically developing children, fine motor skills are acquired in a sequential manner, beginning with infancy, and ending in late childhood. Since children spend most of their time in the classroom, the acquisition of fine motor skills is a primary objective of educational institutions. Educators assist children in reaching their developmental milestones by guiding the children in school-based activities, such as cutting with scissors, writing with pencil and paper, keyboarding, etc., that support motor planning and bilateral coordination (Maldarelli et al., 2015). Of these activities, handwriting is of particular importance as it encompasses several performance skills associated with fine motor development. The development of fine motor skills is essential for young children as these skills enable them to perform movements needed for occupational engagement. To effectively utilize these skills, the child must first develop the appropriate body structures and functions that facilitate movement. Namely, the small muscles and joints of the fingers, hands, and wrists are necessary for functional grasp and release. These actions, though seemingly effortless, require precision and accuracy which is facilitated through gross motor movements and neurological functions (e.g., cognition, vision, and perception). Essentially, such processes are required for fine motor control, in-hand manipulation, hand-eye coordination, and visuomotor integration, which are prerequisites for handwriting (Lin et al., 2017).

Purpose/Aims

The purpose of this study is to identify and compare the types of writing readiness, traditional handwriting, and technology-based activities as well as the time spent in these activities in kindergarten through fifth grade classrooms.
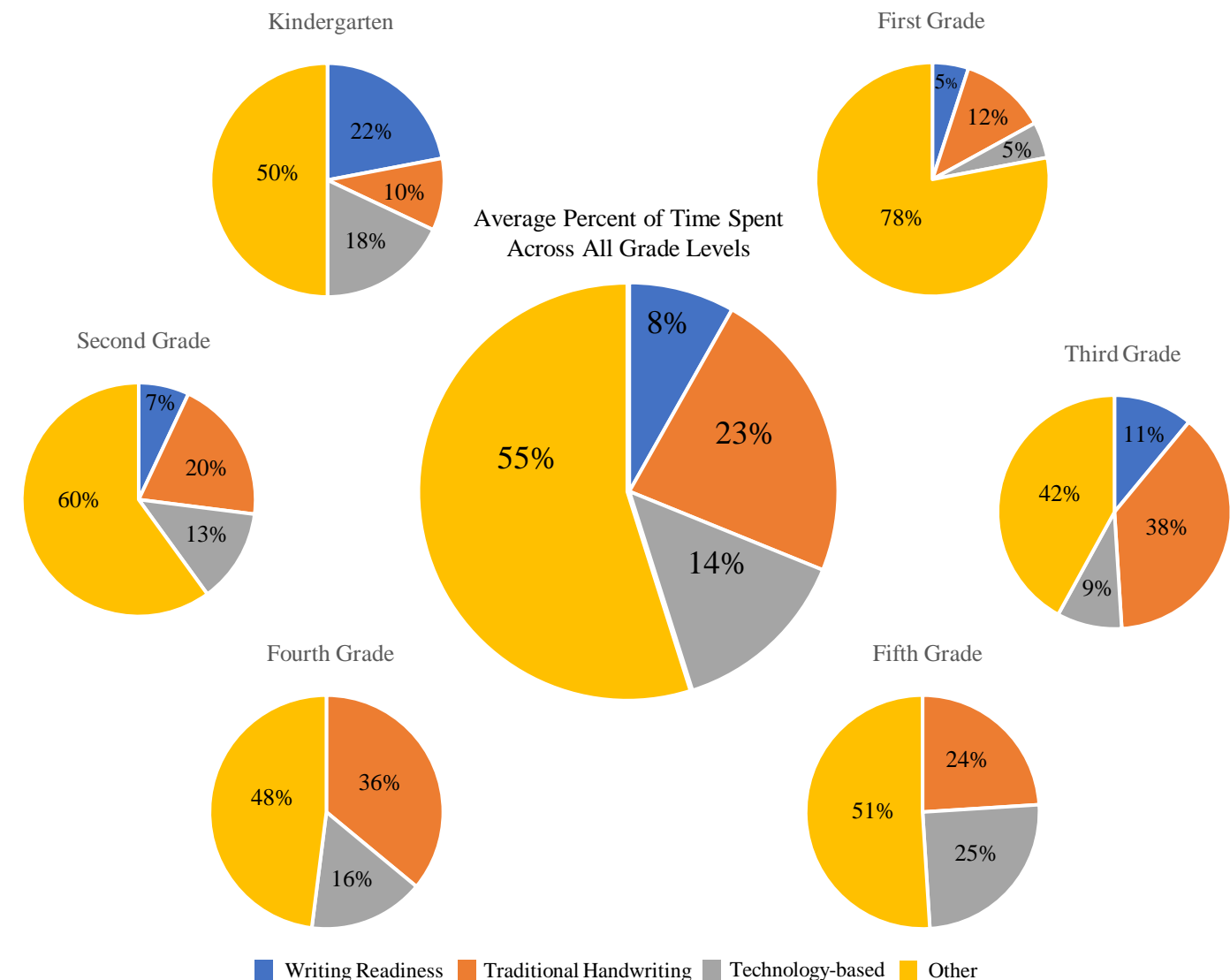
The primary aims of this study were to:

1. Identify the types of activities and amount of time spent engaging in writing readiness activities.
2. Identify the types of activities and amount of time spent engaging in traditional handwriting (paper/pencil) activities.
3. Identify the types of activities and amount of time spent engaging in technology-based activities.
4. Compare the types of activities found in primary aims 1, 2, and 3.

Results

Activity Time-Table

Grade	Time Spent in Each Activity Category			
	Writing Readiness	Traditional Handwriting	Technology-Based	Other
Kindergarten	90 minutes (22%)	39 minutes (10%)	72 minutes (18%)	204 minutes (50%)
First grade	20 minutes (5%)	50 minutes (12%)	20 minutes (5%)	315 minutes (78%)
Second grade	28 minutes (7%)	82 minutes (20%)	52 minutes (13%)	243 minutes (60%)
Third grade	46 minutes (11%)	155 minutes (38%)	35 minutes (9%)	169 minutes (42%)
Fourth grade	0 minutes (0%)	147 minutes (36%)	66 minutes (16%)	192 minutes (47%)
Fifth grade	0 minutes (0%)	97 minutes (24%)	103 minutes (25%)	205 minutes
Total Time: (2430)	184 minutes (8%)	570 minutes (23%)	348 minutes (14%)	1328 minutes (55%)

Note: Percentages for each grade were calculated based on the total time in class which was 405 minutes; total time spent in each category for all classes as a whole was calculated based on a total of 2430 minutes.

Activity Categories and Examples

Activity Category	Example
Writing Readiness	Cutting and gluing Using manipulatives for math game Using crayons or markers to draw Manipulating playdough Point to letters or numbers
Traditional Handwriting	Paper and pencil tests Writing on worksheet Writing on whiteboard
Technology-Based	Typing on laptop Tapping on iPad Writing on smartboard Using iPad during breaks
Other	Special Classes such as P.E, Music, Computer, Library and Art Playing at recess Transitions Bathroom breaks Lunch Singing songs Snack time

Kindergarten: Writing Readiness 22%, Traditional Handwriting 10%, Technology-based 18%, Other 50%

First Grade: Writing Readiness 5%, Traditional Handwriting 12%, Technology-based 5%, Other 78%

Second Grade: Writing Readiness 7%, Traditional Handwriting 20%, Technology-based 13%, Other 60%

Third Grade: Writing Readiness 11%, Traditional Handwriting 38%, Technology-based 9%, Other 42%

Fourth Grade: Traditional Handwriting 36%, Technology-based 16%, Other 48%

Fifth Grade: Traditional Handwriting 24%, Technology-based 25%, Other 51%

Average Percent of Time Spent Across All Grade Levels: Writing Readiness 8%, Traditional Handwriting 23%, Technology-based 14%, Other 55%

Legend: Writing Readiness, Traditional Handwriting, Technology-based, Other

Methodology

Research Design Statement

In this descriptive study, qualitative and quantitative data was collected regarding the time spent and types of activities in elementary school classrooms in Madison, Mississippi.

Participants

The participants of the study were a cohort (one classroom) of typically developing children from each classroom (kindergarten through fifth grade classrooms) determined by the school principal based on the classroom teacher's competence and overall comfort level of teaching with observers present

Data Collection

The researchers utilized an observation form that was designed by the research team. This observation instrument was developed utilizing the influence of previous studies. The observation form was used to record writing readiness activities, traditional handwriting activities, technology-based activities, and other activities observed throughout the course of a typical school day.

Data Analysis

After observational data was recorded, the team then categorized the data into the four groups and synthesized the time allotted for each category of activity. This data was recorded on a categorization form that was developed by the research team utilizing the influence of previous studies. The activity categories were based on previous research, (i.e., Marr et. al. 2003; and McHale & Cermak, 1992) and the primary investigator's experience working as an occupational therapist in the public education sector.

Conclusion

This study provides evidence regarding activities reflecting today's elementary school classrooms. Though the majority of the day was spent in the other category, this time could potentially be utilized by practitioners for intervention. The second largest portion of the day was spent in traditional handwriting; however, there appears to be a decline of this activity in the classroom since the landmark study done by McHale and Cermark may have detrimental effects on a child's handwriting abilities (1992). Children who struggle with handwriting may need time outside of the classroom in order to improve needed skills. Technology usage was similar to those in previous studies, but a variety of technology in the classroom was identified in this study which could prove useful to practitioners. This study gives a more complete view of today's elementary school classrooms, and this information could be utilized by educators, parents, and practitioners concerning elementary school children.

Limitations

- Small sample size from with one classroom per grade from one school in one city.
- Observation occurred only on one day of the week.
- The research team developed their own observation tool and methods of analysis based on previous studies.

Occupational Therapy Implications

Findings from this study could be utilized by occupational therapy practitioners who work within school-based settings. Children who struggle with handwriting, keyboarding or other fine motor skills may need intervention in order to be successful in the classroom. In addition, this study identified that the majority of the time spent by children in elementary classrooms fell within the other category. Activities such as lunch, specials, recess, and transitioning from one activity/room to another were just a few of these activities. Having this knowledge, school-based practitioners could potentially utilize these portions of the day for provision of intervention. Finally, technology usage in the classroom is both evident and important. Though the percentage of technology used was similar to previous studies, the use of technology for testing, completion of assignments and as an additional learning resource should be noted. Proper knowledge and use of laptops, iPads, and smart boards have potential to be utilized to improve classroom participation and success.