CRITICALLY APPRAISED PAPER (CAP)

FOCUSED QUESTION
Can 7 months of fully integrated occupational therapy services in an integrated kindergarten classroom help improve fine motor and emergent literacy outcomes for children with and without disabilities?


CLINICAL BOTTOM LINE
Legislative changes are resulting in a shift in school therapy practice from traditional “pull-out” models to more integrated contextual services, whereby students receiving services build skills in the classroom with their peers. Full assimilation of occupational therapy services with classroom learning requires an understanding of classroom philosophy, curricula, and culture. Using a one-group pretest–posttest design, the authors of this descriptive study tested synthesized occupational therapy services embedded in an emergent literacy program in integrated kindergarten classrooms. They also documented fine motor and emergent literacy outcomes. Participants were a convenience sample of 37 kindergarten students with and without disabilities. Direct and indirect occupational therapy services were provided by one occupational therapist throughout a 7-month period and were fully integrated into two kindergarten classrooms. The occupational therapist providing services implemented five varying indirect interventions (assessing environment and culture, building interventions into the curriculum with other team members, etc.) and direct services (targeting activities of daily living, social skills, visual motor tasks, writing, fine motor skills, etc.) throughout a 7-month period, for an average of 28 sessions per child with a disability and 18 sessions for each child without a disability. All services were fully embedded in the classroom curriculum. The results support the idea that a combination of direct and indirect integrated occupational therapy services can address the occupational performance needs of children with disabilities as well as those of children at risk for delay.

RESEARCH OBJECTIVE(S)
List study objectives.

- Document and describe what fully integrated occupational therapy services would look like in an emergent literacy program.
- Document fine motor and emergent literacy outcomes for children with and without disabilities receiving fully integrated occupational therapy services embedded in the classroom curriculum.

**DESIGN TYPE AND LEVEL OF EVIDENCE**

Level III: Descriptive, one-group pretest–posttest design

**Limitations (appropriateness of study design)**
Was the study design type appropriate for the knowledge level about this topic? Circle yes or no, and if no, explain.

**YES**

**SAMPLE SELECTION**
How were participants recruited and selected to participate? Please describe.

Participants were a convenience sample of 37 students, ages 60–83 months, with and without disabilities enrolled in two integrated kindergarten classrooms with fully integrated occupational therapy services. All students in these two classrooms were invited to participate, and written parental consent and student assent were obtained from all invited participants.

**Inclusion Criteria**

NR

**Exclusion Criteria**

NR

**SAMPLE CHARACTERISTICS**

\( N = 37 \)

<table>
<thead>
<tr>
<th>% Dropouts</th>
<th>0</th>
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</thead>
<tbody>
<tr>
<td>#/% Male</td>
<td>NR</td>
</tr>
<tr>
<td>#/% Female</td>
<td>NR</td>
</tr>
<tr>
<td>Ethnicity</td>
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</tr>
</tbody>
</table>

**Disease/disability diagnosis**

- Children with disabilities (\( n = 12 \))
  - Down syndrome (\( n = 3 \))
  - Cerebral palsy (\( n = 1 \))
  - Mental retardation (\( n = 4 \))
  - Undiagnosed developmental delays (\( n = 4 \))
- Typically developing children (\( n = 25 \))
Check appropriate group:

<table>
<thead>
<tr>
<th>Group</th>
<th>20–50/study group</th>
<th>51–100/study group</th>
<th>101–149/study group</th>
<th>150–200/study group</th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
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**INTERVENTION(S) AND CONTROL GROUPS**

*Add groups if necessary*

**Group 1**

| Brief Description | The kindergarten classrooms followed the district’s core curriculum, which applied an emergent literacy framework. Individualized education plan (IEP) goals for children with disabilities were integrated into classroom activities. Throughout the intervention period (7 months), an occupational therapist delivered direct and indirect services that were fully integrated into the classroom curriculum. Indirect services included teacher consultation, preparation and planning, and parent consultation. The occupational therapist spent time learning about the emergent literacy curriculum, observing classroom routines, learning about the classroom cultures, providing in-services for teachers and support staff, selecting and introducing materials, consulting with teachers and other team members, and planning transdisciplinary interventions. Direct services focused on promoting successful participation in classroom activities and developing related performance skills (fine motor development, sensory processing, and social function). Direct services were primarily administered in a group setting, with groups composed of children with and without disabilities. Group activities were designed to promote fine motor skill development in conjunction with IEP and emergent literacy curriculum goals. Although interventions were focused on meeting the needs of the children with disabilities, the integrated group format enabled typically developing children at risk for delay to receive direct occupational therapy services as well. |
| Setting | All services were provided in the integrated kindergarten classrooms. |
| Who Delivered? | Services were delivered by one occupational therapist with more than 20 years of pediatric experience. Cotreatment with an art teacher or music therapist occurred in approximately half of the group sessions. |
| Frequency? | The occupational therapist delivered services 2 days per week. The children with disabilities received a mean of 28 sessions over 7 months, whereas children without disabilities received a mean of 18 sessions over 7 months. |
| Duration? | 7 months during one academic school year |

**Intervention Biases**

*Circle yes or no and explain, if needed.*

**Contamination**

| YES/NO | There was no control group. |
Co-intervention

**YES/NO**

All children were also receiving fine motor and emergent literacy instruction from the general education teacher. In addition, the children with disabilities also received speech-language pathology, adapted physical education, music therapy, and physical therapy services as needed. Additional therapy services outside of the school setting were not reported.

Timing

**YES/NO**

Given the design of the study and the lack of a control group, the results could be due to maturation. The researchers calculated the proportional change index for tests that yielded age-equivalent scores to demonstrate accelerated development during the intervention period.

Site

**YES/NO**

All interventions were administered in the kindergarten classroom.

Use of different therapists to provide intervention

**YES/NO**

MEASURES AND OUTCOMES

Complete for each relevant measure when answering the evidence-based question:
name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article—yes/no/NR [not reported]), and how frequently the measure was used

**Fine Motor Performance Instruments**

- **Fine Motor scale of the Peabody Developmental Motor Scales—2 (PDMS–2)**
  
  This assessment was used to measure fine motor performance pre- and postintervention. It is a norm-referenced, standardized assessment. Standard scores and age equivalents were used in the data analysis. Test–retest reliability is excellent \( r = .93 \), interrater reliability is excellent \( r = .98 \), and validity is not reported.

- **Visual–Motor Integration (VMI) test**
  
  The VMI is a norm-referenced, standardized test used to measure visual–motor skills. It was administered pre- and postintervention. This assessment has a test–retest reliability of .87 and interrater reliability of .94; validity data are not reported.

- **In-hand manipulation**
  
  In-hand manipulation was measured with five small pegs from a nine-hole pegboard. This assessment was administered pre- and postintervention. Reliability and validity data are not reported.

- **Translation and rotation speed**
  
  Translation and rotation speed were recorded for each hand through administration and scoring procedures developed by Case-Smith. Mean time and number of drops were used in data analysis for translation speed. A composite
score based on mean time, number of drops, and stabilization was used in data analysis for rotation speed. Assessments were administered pre- and postintervention. No reliability or validity data are reported.

- **Pencil grasp**
  Pencil grasp was assessed during VMI testing and rated on the basis of a 10-point hierarchy. Assessment was administered pre- and postintervention. No reliability or validity data are reported.

**Emergent Literacy Skills Instruments**

- **Three subtests of Clay’s Observation Survey of Early Literacy Achievement (OSELA): Letter Identification, Concepts About Print, and Hearing and Recording Sounds**
  This assessment was used to measure emergent literacy skills. The Letter Identification subtest measures ability to identify uppercase and lowercase letters, the Concepts About Print subtest measures understanding of how to handle a book and conventions of printed language, and the Hearing and Recording Sounds subtest measures phonemic awareness. These assessments were also given pre- and postintervention. This assessment has high construct and face validity and high reliability.

- **Approximations to Text**
  This tool was used to assess children’s behaviors during a story reading by an adult and their ability to “reread” the story immediately after the story reading. The test was videotaped and scored on a 35-point scale by two raters. Reliability and validity data were not reported.

**Measurement Biases**

Were the evaluators blind to treatment status? *Circle yes or no, and if no, explain.*

YES/NO Evaluators included three occupational therapists and three early childhood teachers. It was not reported whether the evaluators were blind to the treatment status or study objectives, but all participants were in the same treatment group.

Recall or memory bias? *Circle yes or no, and if yes, explain.*

YES/NO

Others (list and explain):

**RESULTS**

List results of outcomes relevant to answering the focused question. Include statistical significance where appropriate (*p*<0.05). Include effect size if reported.

Both classes as a whole made statistically significant improvements in all measures (*p* < .05). The children without disabilities made statistically significant improvements in all measures (*p* < .05). The children with disabilities made statistically significant
improvements in two fine motor assessments (PDMS–2 and pencil grip) and three emergent literacy assessments (Concepts About Print, Letter Identification, and Approximations to Text). Medium or larger effect sizes ($\eta^2 > .25$) were found for children with disabilities for the PDSM–2 Fine Motor Scale, pencil grip, and Letter Identification scores, which indicates large changes between pretesting and posttesting. The children without disabilities made greater improvements on the Letter Identification and Concepts About Print assessments, relative to the children with disabilities. The researchers calculated the proportional change index (PCI) for the PDMS–2 and VMI scores to determine the estimated rate of development at preintervention relative to the rate of development during the intervention period. PCI scores greater than 1.0 indicate accelerated development during the intervention period. Children with disabilities demonstrated a mean PCI score of 4.0 for the PDMS–2 Visual Motor subtest, 9.5 for the PDMS–2 Grasping subtest, and 2.3 for the VMI. Mean PCI scores for children with disabilities were also greater than 1.0 in both assessments.

Was this study adequately powered (large enough to show a difference)? *Circle yes or no, and if *no*, explain.*

YES/NO

Were appropriate analytic methods used? *Circle yes or no, and if *no*, explain.*

YES/NO

Were statistics appropriately reported (in written or table format)? *Circle yes or no, and if *no*, explain.*

YES/NO

**CONCLUSIONS**

State the authors’ conclusions that are applicable to answering the evidence-based question.

The results of this study support the idea that integrated occupational therapy services can serve as an effective method of simultaneously addressing the needs of children with disabilities and typically developing children who might be at risk for delays in fine motor and emergent literacy skills. Although no conclusions can be made about causality, given the lack of randomization or a control group, statistically significant improvements in fine motor and emergent literacy outcomes were documented with the adoption of fully integrated occupational therapy services embedded in an emergent literacy curriculum. In addition, PCI scores suggest that the demonstrated improvements were beyond what might be expected from maturation alone. These improvements were observed with a model for services that included both direct and indirect services, which provides support for the idea that time spent in indirect services is
valuable to providing contextual services. This model of integrated services presents a viable option for providing the government-mandated least restrictive environment in the school setting.