

Assessment of the Physical Literacy Environment in Early Childhood Classrooms

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Abstract

This study aims to assess the physical literacy environment in 30 early childhood classrooms servicing 4- to 6-year-old children. A high-quality literacy environment that includes a variety of materials and resources is an important part of children's emergent literacy, as research shows their use supports oral and written language development (Dynea et al., 2018; Yang et al., 2023). Observations were conducted using the Early Language and Literacy Classroom Observation Pre-K (ELLCO Pre-K; Smith et al., 2008) and the Literacy Environment Checklist (Smith et al., 2002), along with qualitative observational data and photographs of the classrooms. Overall, results show a low or basic level of quality of the physical literacy environment. Classrooms lack quality features such as a wide variety of books, writing materials in learning centers, accessible environmental prints, and representations of children's diversity in reading materials. This level of quality is not considered sufficient to adequately support the language development of 4- to 6-year-old children, particularly those from disadvantaged backgrounds (Cunningham, 2010). These findings underline the importance of teachers' professional development to better support emergent literacy through the physical environment of early childhood classrooms.

Keywords: emergent literacy, early childhood education, preschool, kindergarten, physical literacy environment, reading and writing

1. Introduction

1.1 Emergent Literacy in Early Childhood Education Classrooms: Importance of the Physical Environment

The physical environment of early childhood classrooms supports children's emergent literacy (Dynea et al., 2018; Morrow et al., 2019; Yang et al., 2023). It refers to the classroom layout and the materials that support the development of oral language and early literacy, as well as the various environmental prints displayed in the classroom (Guo et al., 2012; Yang et al., 2023). Learning centers are therefore designed to stimulate oral language as well as reading and writing, rendering materials and resources available and accessible to children (Guo et al., 2012). According to Morrow et al. (2019), the literacy physical environment is the foundation for emergent literacy, which refers to children's knowledge, skills and attitudes toward oral language, phonological awareness, and print awareness. Indeed, a classroom with well-organized written materials (e.g., posters, labels, books) and writing materials (e.g., pencils, paper, envelopes) sustains children's motivation to use these materials (Drainville & Charron, 2021). Furthermore, a high-quality literacy environment has not only been shown to sustain children's engagement pertaining to literacy activities, but also to predict their phonological awareness and expressive vocabulary (Baroody & Diamond, 2016) and to have positive effects on children's early writing skills (Guo et al., 2012).

1.2 Assessing the Quality of the Physical Literacy Environment

Emergent literacy has been the object of several studies in the past few decades, as it sparks interest among researchers for its role in school readiness, particularly regarding reading and writing (Charron et al., 2022). Theoretical considerations have been presented in several studies as to the components of emergent literacy (e.g., Giasson, 2011; Rohde, 2015; Saracho, 2017; S en echal et al., 2001; Whitehurst & Lonigan, 1998). The present study is based on Rohde's theoretical model of emergent literacy, as it also considers the context in which

children participate in their own development and learning (Rohde, 2015), including the early childhood classroom and its physical attributes. Regarding the physical environment, emergent literacy components are presented in Table 1 along with examples of classroom elements that can support children's oral language, phonological awareness, and print awareness.

Table 1. Emergent literacy components and associated elements of classrooms' physical environment

Emergent literacy components (Rohde, 2015)	Examples of elements relating to the classroom's physical environment (Drainville & Charron, 2021; Dynia et al., 2018; Morrow et al., 2019; Smith et al., 2008; Villeneuve-Lapointe et al., 2023)
Oral language	Dedicated learning centers to foster small group interactions Riddles and storytime games Open-ended materials (e.g., loose parts) that sustain discussions among children Gathering space for group discussions
Phonological awareness	Poetry, alphabet, and picture books Listening center (recorded stories and songs) Functional prints (e.g., schedule, calendar) Sound games (syllables, phonemes, rhymes)
Print awareness	Alphabet at children's level Word wall Name tags for identification 5 to 8 books available per child

In terms of classroom layout, a high-quality physical environment includes materials and resources that support emergent literacy in all areas of the classroom (Charron et al., 2022; Drainville & Charron, 2021; Guo et al., 2012; Villeneuve-Lapointe et al., 2023) and exposes children to a variety of contents, presented in different forms and with different functions (Dynia et al., 2018; Villeneuve-Lapointe et al., 2023). To foster children's active learning, the teacher must organize the classroom areas so that children can have multiple opportunities for active learning and make the best use of their environment (Hohmann et al., 2007). Organizing the classroom into well-defined learning areas, such as reading and writing centers, promotes varied forms of play, facilitates observation by the teacher and supports the child's autonomy by providing easy access to and storage of materials (Drainville & Charron, 2021; Hohmann et al., 2007; Villeneuve-Lapointe et al., 2023). While learning centers are generally set up in the classroom to facilitate spatial organization and storage, they are interrelated and in continuity with one another. For example, the reading center, writing center and dramatic play area are often adjacent, given their reciprocal influence (Morrow et al., 2019). In addition, the layout of the classroom into different, well-defined learning centers and the presence of varied materials in sufficient quantity facilitate interactions between children and support their oral language (Drainville & Charron, 2021). In terms of physical literacy environments, high-quality classrooms will provide a variety of book materials, designated literacy areas, writing materials, and include teacher and child-directed writing displays (Yang et al., 2023).

1.3 Findings from Previous Studies

Despite numerous studies highlighting the contribution of early childhood classrooms' physical literacy environment to children's emergent literacy skills, observed quality levels generally remain low (Charron et al., 2022; Piasta et al., 2019; Zhang et al., 2015). For instance, classrooms observed contained an insufficient number of books accessible to children, rare evidence of classroom diversity (e.g., children's work displays, books in different languages), limited environmental prints (e.g., posters, labels), writing materials (e.g., various papers, notebooks, pencils) or games related to early reading and writing (e.g., letter or word puzzles) (Drainville & Charron, 2021).

Such findings are a cause for concern, as low or even basic levels of quality are considered insufficient to adequately support children's language development. Indeed, a study conducted by Cunningham (2010) highlighted that 60% of the 428 children observed in kindergarten were considered vulnerable in terms of language development when the literacy environment quality was basic, compared to 43% of children when the quality level was exemplary. Yet it seems rare for such a level of quality to be achieved (Cunningham, 2010; Zhang & Cook, 2019).

Pre- and in-service training in early childhood education, which is often considered insufficient for teachers working in early childhood classrooms (Lehrer et al., 2017), could explain the lack of knowledge among teachers regarding the quality elements that pertain to the classroom's physical environment to support emergent literacy

(Lachapelle, 2020). In this regard, this study aims to assess and document early childhood classrooms' physical literacy environment, which will contribute to teachers' professional development in implementing high-quality practices.

1.4 Research Aims

As previously stated, the physical literacy environment is important to study because of its positive influence on emergent literacy, including oral language, phonological awareness and print awareness (Rohde, 2015). As such, this warrants further investigation to better understand how quality elements are integrated in early childhood education classrooms. This study examined in detail the physical literacy environment (e.g., books, environmental prints, writing materials) of early childhood classrooms located in Eastern Canada. Early childhood education is an important context to bolster literacy skills in diverse settings (Morrow et al., 2019). By providing a classroom with a variety of literacy-related materials, children are more likely to use these materials and develop skills such as alphabet knowledge, word reading, and understanding the purposes of print (Dynea et al., 2018). This research has two specific aims: 1) Assess early childhood classrooms' physical features related to books, book reading, print, and early writing; 2) Document early childhood classrooms regarding their physical literacy environments.

2. Method

2.1 Participants

Following invitation letters sent to 12 school boards in Quebec (Canada), 8 accepted to participate in this study. A letter of consent was signed by the voluntary participating teachers. A convenience sample consisting of 30 early childhood teachers was selected for this study. Groups included children aged 4 to 5 years old ($n = 7$) and 5 to 6 years old ($n = 17$). Teachers were all female, with an average age of 43.13 years. The majority held a bachelor's degree or higher (86.6%) and had an average of 17.04 years of teaching experience, including 13.30 years in early childhood education. Participating schools were mostly located in urban areas in Montreal (Quebec) and slightly below average in terms of socioeconomic status. Data was collected from February to June 2022. This study was approved by the first author's university research ethics committee.

2.2 Observational Tools and Procedures

2.2.1 Early Language and Literacy Classroom Observation Pre-K

To assess the classrooms' physical literacy environment, observations were conducted with the Early Language and Literacy Classroom Observation Pre-K (ELLCO Pre-K; Smith et al., 2008). Trained observers were present for a morning observation lasting between 2.5 and 3 hours. Interrater reliability was 98.3% and was calculated for 20% of the observations. According to Quinn et al. (2021), the ELLCO Pre-K tool is well suited to the context of early childhood education. The ELLCO Pre-K includes 19 items rated on a 5-level Likert-type scale (1 = "deficient"; 2 = "inadequate"; 3 = "basic"; 4 = "adequate" and 5 = "exemplary"). These items are divided into 5 sections: a) Classroom Structure (4 items), b) Curriculum (3 items), c) Language Environment (4 items), d) Books and Book Reading (5 items), and e) Print and Early Writing (5 items). The internal consistency ($\alpha = .90$) of the ELLCO Pre-K is considered very good (Taber, 2018). For this study, we will focus on the last two sections (see Table 2), Books and Book Reading ($\alpha = .80$) and Print and Early Writing ($\alpha = .79$), as these sections include items relating to the physical literacy environment.

Table 2. ELLCO Pre-K sections and items' description relating to the physical literacy environment (Smith et al., 2008)

Books and Book Reading	
Item	Description
Organization of Book Area	Distinct book area that is physically attractive and comfortable Books in excellent condition and in ample supply for the number of children in the classroom Book area easily accessible to children so that they can explore it freely and independently
Characteristics of Books	Books cover a range of topics and issues Books offer a wide variety in terms of levels of difficulty and types of graphic elements used (e.g., illustrations, photographs, cartoons) Multiple book genres are available (e.g., fictional narratives, poetry, nonfiction) Selections include diverse representations of characters and family structures, including people of different race, gender, and ability
Print and Early Writing	
Item	Description
Early Writing Environment	Varied and appropriate writing materials and tools (e.g., alphabet, paper, word cards, clipboards, props such as menus) integrated throughout the classroom as well as in a designated writing area Multiple examples of the written word (e.g., children's work, posters, class-generated big books)
Environmental Print	Environmental prints in the classroom Evidence of varied uses of environmental prints Teacher-made models of print conventions

2.2.2 Literacy Environment Checklist

A complementary checklist to the ELLCO Pre-K tool was used to collect additional data regarding classroom areas and materials related to reading and writing. The Literacy Environment Checklist (Smith et al., 2002) includes 23 items divided into 5 categories: a) Book Area (3 items); b) Book Selection (5 items); c) Book Use (2 items); d) Writing Materials (6 items) and e) Writing Around the Room (7 items). These 23 items are grouped into 2 subscales: 1) Reading (10 items) and 2) Writing (13 items). Trained observers generally completed the checklist during the same morning observation as the ELLCO Pre-K, before children's arrival, moving around the classroom and assessing the physical literacy environment using the 23-item checklist. Detailed items from the Literacy Environment Checklist are presented in Table 3.

Table 3. Literacy environment checklist items (Smith et al., 2002)

Subscale: Reading		
	Score range	Items
Book Area	0–3	Area set aside for book reading; orderly and inviting; soft materials
Book Selection	2–9	Books difficulty level; number of books; availability of books to children, number of varieties or genres; cultural diversity and nonstereotyped books and prints; number of books related to current study/project
Book Use	0–2	Books available in all interest areas; place for children to listen to recorded books/stories
Total score for Reading	2–14	
Subscale: Writing		
Writing Materials	0–8	Visible alphabet; word cards; templates or tools to help children form letters; number of varieties of paper; number of varieties of writing tools; distinct area for writing
Writing Around the Room	0–13	Number of varieties of teacher dictation on display; number of charts, big books, or other evidence of full-group literacy; number of varieties of children's writings; writing tools and prompts in dramatic play and block area; alphabet puzzle; word puzzles
Total score for Writing	0–21	

2.2.3 Classroom Photographs

Photographs were also taken when children were absent (again, usually before their arrival in class) to collect visual data in the classrooms, with a focus on physical features relating to oral language, reading, and writing. Wide-angle photographs were taken to give a sense of the classrooms' general organization, while other photographs focused on learning centers, including the reading and writing centers when present, and any other element (e.g., environmental prints, children's works and writings, teacher-made prints) pertaining to oral

language, reading, and writing. An average of 24 photographs were taken per classroom.

2.3 Data Analysis

With regards to the first aim of this study, which was to assess early childhood classrooms' physical features related to books, book reading, print, and early writing, descriptive statistics (means and standard errors) were calculated for the ELLCO Pre-K *Books and Book Reading* and *Print and Early Writing* sections, as well as the Literacy Environment Checklist scores for all sections (*Book Area*, *Book Selection*, *Book Use*, *Writing Materials* and *Writing Around the Room*).

As for the second aim, which was to document early childhood classrooms regarding their physical literacy environments, content analyses were applied to qualitative field notes from classroom observations, and more specifically evaluation coding, as suggested by Saldaña (2021). Field notes were taken for *Organization of Book Area*, *Characteristics of Books*, *Early Writing Environment* and *Environmental Print*. Codes used for analyses were based on items and descriptions of these sections (see Table 2). Also, photographs were analyzed using categories and quality indicators included in the ELLCO Pre-K observational tool in the *Books and Book Reading* (items: *Organization of Book Area*) and *Print and Early Writing* (items: *Early Writing Environment* and *Environmental Print*). As *Characteristics of Books* necessitate for books to be individually assessed in terms of content and genre, photographs were not used for this item. Using QDA-Miner 6 software (Provalis Research, 2022), analytical categories and quality indicators were integrated in a systematic color-coding grid (see Table 4) to identify physical features in each photograph as they pertained to the literacy classroom environment.

Table 4. Examples of color-coding grid codes used for classroom photographs analyses

Organization of Book Area - Physical space
<i>Distinct area</i>
<i>Attractive area</i>
<i>Comfort</i>
<i>Accessibility</i>
Organization of Book Area - Books
<i>Quantity</i>
<i>Audiobooks</i>
<i>Books placed in interest areas of the classroom</i>
Early Writing Environment
<i>Environmental prints</i>
<i>Writing materials and tools</i>
<i>Writing center</i>

3. Results

3.1 Early Language and Literacy Classroom Observation (ELLCO Pre-K)

Overall, findings show a basic level of quality for the physical environment relating to emergent literacy (see Table 5 for descriptive statistics). More specifically, the quality level of the literacy environment related to *Books and Book Reading* is in the basic range (average of 3.37/5), including *Organization of Book Area* (3.10/5) and *Characteristics of Books* (2.93/5). The *Print and Early Writing* section is also considered basic (2.90/5), including for *Early Writing Environment* (2.80/5) and *Environmental Print* (3.37/5). Similar findings were also reported in other studies that have used the ELLCO Pre-K (Arteaga et al., 2019; Barker et al., 2021; Charron et al., 2022; Landry et al., 2021; Zhang & Cook, 2019).

Table 5. ELLCO Pre-K descriptive statistics for books and book reading/print and early writing

	M (SD)
Books and Book Reading	3.37 (0.72)
Organization of Book Area	3.10 (1.03)
Characteristics of Books	2.97 (1.07)
Print and Early Writing	2.90 (0.87)
Early Writing Environment	2.80 (0.96)
Environmental Print	3.37 (0.85)

Note. N = 30. Score range: 1–5. M = mean, SD = standard deviation.

3.2 Literacy Environment Checklist

As evidenced by the low average scores from the Literacy Environment Checklist (see Table 6), the physical literacy environment of observed classrooms incorporates few environmental prints such as posters, the alphabet, word labels, children's names, concept maps, and writing materials such as a variety of papers, pencils, notebooks, and magnetic letters. It was also noted that environmental prints such as the alphabet are often placed too high on classroom walls for children to refer to.

Table 6. Literacy environment checklist descriptive statistics

Subscale: Reading		
	Score range	M (SD)
Book Area	0–3	1.77 (1.10)
Book Selection	2–9	6.37 (1.90)
Book Use	0–2	0.37 (0.61)
Total score for Reading	2–14	8.50 (2.97)
Subscale: Writing		
Writing Materials	0–8	3.93 (1.62)
Writing Around the Room	0–13	3.37 (2.67)
Total score for Writing	0–21	7.30 (3.83)

Note. N = 30. M = mean, SD = standard deviation.

Furthermore, the *Reading* subscale shows a low to basic quality range, while the *Writing* subscale remains in a low range. A paired T-test revealed that there was a significant difference between average scores for the *Reading* and *Writing* subscales ($t_{(29)} = 14,805$; $p < .001$). Teachers seem to focus more on reading than writing during daily activities, which might explain why writing materials are less prominent in early childhood classrooms (Hindman & Wasik, 2008; Lachapelle, 2020; Quinn et al., 2021).

3.3 Field Notes and Photographs of Physical Features of the Classroom Literacy Environment

Furthermore, analyses of qualitative data and classroom photographs also reveal that many classrooms ($n = 17$) lack a distinct, appealing, and comfortable book area. In most classrooms ($n = 28$), less than 5 books are available per child, and children's diverse backgrounds are generally not represented in books displayed. In most classrooms ($n = 28$), books are easily accessible to children, i.e. at their height. A few classrooms ($n = 4$) provide the necessary equipment for children to listen to recorded stories or books. Most classrooms ($n = 19$) provide books for children in classroom areas other than the reading center, though in limited quantity.

Writing materials are available in all classrooms ($n = 30$) but are not organized specifically for writing activities. In classrooms where a writing center is available ($n = 13$), writing tools consist of pens or markers, paper, word cards and worksheets. On rare occasions, writing centers include manipulables, such as magnetic or wooden letters. Also, writing tools are available in other areas of all classrooms, and include paper, different types of crayons, stamps, worksheets, and small writing boards.

Environmental prints are observed in all 30 classrooms and generally include the following: calendar, daily schedule, classroom rules, children's chores, behaviour charts, children's anniversaries, prints relating to a theme, weather charts, alphabet, shapes, colors, and seasons. Children's artwork is also often displayed, with some type of writing attempt, usually children's names. Only one classroom displays evidence of conceptual mapping and teacher dictation. It should also be noted that environmental prints are mostly used in classrooms for identification purposes.

4. Discussion

Study findings suggest that teachers occasionally integrate books for pleasure and learning in classroom centers, sometimes set up an engaging book area, and more rarely include writing materials in an organized manner. Like other studies, it appears that teachers are not taking every opportunity to enhance the physical literacy environment to offer meaningful contexts that support oral language and literacy (Drainville & Charron, 2021; Gerde et al., 2019; Guo et al., 2012). It is of concern that classrooms assessed through this study show low to basic quality levels in terms of the physical literacy environment, as access to literacy-rich environments is a known predictor of higher gains in emergent literacy skills (Altun et al., 2018; Baroody & Diamond, 2016; Guo et al., 2012; Yang et al., 2023).

Compared to process quality, such as teacher-child interactions, the classroom literacy environment is considered

highly malleable (Markussen-Brown et al., 2017), which suggests it is more feasible for teachers to provide age-appropriate literacy materials and organize learning areas in the classroom to support oral language, as well as reading and writing activities (Yang et al., 2023). These findings underline the importance of supporting teachers in implementing a high-quality physical literacy environment. Recommendations include adding more books representative of children's diversity and culture in different classroom centers, dedicating an area for writing activities with different kinds of papers, pencils, and alphabet stencils, as well as include writing materials in different play centers and interest areas (Charron et al., 2022; Quinn et al., 2021).

Results from this study will be relevant for early childhood education research, as they provide rigorous findings regarding the quality of literacy environments in early childhood classrooms. Indeed, data was collected using different yet complementary approaches (systematic observations, field notes, photographs) to better reflect the present reality of early childhood classrooms. As stated earlier, teachers in Quebec have minimal training dedicated to early childhood education (Lehrer et al., 2017). This study demonstrates gaps in educational practices that support emergent literacy, specifically regarding the physical literacy environment of early childhood classrooms. These findings reiterate the importance of supporting teachers by developing knowledge and practices to incorporate well organized areas containing open-ended and polyvalent materials, such as a variety of reading and writing materials, to foster children's oral language, reading, and writing skills (Charron et al., 2022; Elek et al., 2022). Teacher professional development should focus on the needs and capabilities of young children when they develop emergent literacy skills in high-quality literacy environments of early childhood classrooms (Yang et al., 2023).

It has been suggested that teachers' beliefs and knowledge regarding emergent literacy and children's oral and written language development can have an impact on their daily practices, as teachers might consider 4- to 6-year-old children too young to use reading and writing materials in play-based activities (Yang et al., 2023). As such, future research should explore how teachers' beliefs influence their practices regarding reading and writing in early childhood classrooms, as this can play a role in how they manage physical spaces to support emergent literacy. Teachers' role in promoting the use of literacy materials is also an important venue to explore (Guo et al., 2012; Yang et al., 2023), as children's interactions with the literacy materials appear highly variable in classrooms (Sawyer et al., 2018; Vitiello et al., 2012). More research is also warranted to gain better understanding about obstacles (e.g., time constraints, budget) that might interfere with the implementation of a high-quality physical literacy environment in early childhood classrooms (Lachapelle, 2020).

As stated earlier, findings from this study were based on complementary data sources, which allows for a more thorough and rigorous study of the physical literacy environment in early childhood education classrooms. However, some limitations should be noted, including our relatively small sample size and the fact that classrooms were mostly located in urban areas, which might not be representative of a larger population and, therefore, affect the generalizability of results. Given the recognized importance of the physical literacy environment to foster children's emergent literacy skills, findings from this study underscore the need for further studies on that subject, teacher professional development and higher quality practices in early childhood classrooms.

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Authors' contributions

J. Lachapelle and A. Charron were responsible for study design, revising, and data collection. J. Lachapelle drafted the manuscript; A. Charron and H. Beaudry revised it. All authors read and approved the final manuscript.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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