



Who's Counting?

When and How Do We Introduce Number Concepts in Child Care?

ELCC Study on Numeracy & Literacy Practices

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Competence in mathematics is necessary for individuals to successfully compete in an increasingly scientific and technological world. On international assessments, Canadian children perform better than American children, but nevertheless do not do as well as European and Asian children. Furthermore, because children's competency in mathematics before school entry is very predictive of their later performance, early experiences are critical in getting children off to a good start.

Our goal in this study was to gather information about the early numeracy and literacy knowledge, practices, and beliefs of early learning and child care (ELCC) practitioners. A web survey of Canadian Child Care Federation members and recruiting at two major child care conferences generated 768 respondents. Most were from Manitoba, Ontario and British Columbia and were well educated—12% reported university degrees, and almost 60% reported college diplomas.

One third worked in administrative and instructor roles, another third worked directly with children in child care centres and the rest worked directly with children in their home, or in nursery schools or other programs.

Perceived Knowledge of Numeracy and Literacy and Professional Development

We predicted that ELCC practitioners may have little knowledge of what constitutes 'early numeracy' (number concepts) or of how to deliver numeracy content using developmentally-appropriate practices. Consistent with this prediction, respondents said they felt significantly more knowledgeable about early literacy than about early numeracy. They reported attending early numeracy professional development less frequently than other learning activities and were less aware of the availability of early numeracy learning opportunities in comparison to professional development concerning literacy, social skills, or health and safety.

Knowledge about Children's Capabilities. ELCC practitioners varied in how knowledgeable they were about children's capabilities in numeracy and literacy, and their knowledge was related to their experience in working with children.

Based on their responses about the ages at which children become capable of early numeracy and literacy activities (e.g., count to 10, read a few words), the respondents clustered in two groups: one group indicated that children were capable of these skills at a younger age (on average, about a year earlier) than the other group. This "capable younger" group gave responses that were consistent with the developmental literature on when typical children master these skills. This group was also more likely to have worked with children for 10 or more years as compared to the "capable older" group.

Practices. Respondents reported how frequently they participated in a set of literacy, numeracy and social-emotional activities: 428 respondents worked with preschoolers (i.e., children aged 3 and 4 years) and 156 respondents worked with toddlers (i.e., aged 1 and 2 years). In general, for both age groups, ELCC practitioners reported pre-reading and quantity activities less frequently than language and counting activities, suggesting that although ELCC practitioners engage in many basic literacy and numeracy activities, they are doing fewer advanced activities within these areas.

Beliefs. A majority of ELCC respondents agreed or strongly agreed that social and emotional development is the primary goal of early childhood education. However, the majority of respondents also believed that it is their job to teach children about letters, and they believed that numeracy and literacy skills should be assessed regularly. ELCC practitioners also varied in whether early literacy and numeracy activities in the child-care setting should be initiated by the children or by adults or a moderate combination.

The Moderate and Child-initiated groups tended to underestimate children's capabilities. They were more likely than the Adult-guided group to report being anxious about their own mathematics skills and they reported that children are not capable of early arithmetic until age 5. Accordingly, they were less likely to report frequent use of numeracy activities beyond basic counting, presumably because they

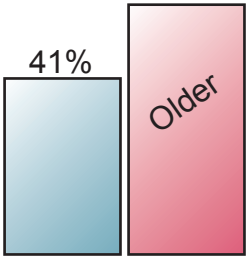
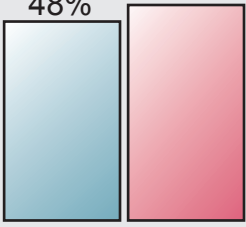
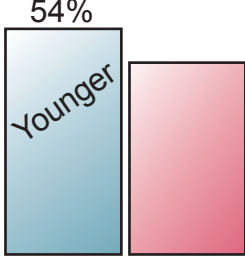
believe such activities would not be a developmentally appropriate practice for the children in their care.

Recommendations

The results of this survey suggest some first steps for improving and supporting early numeracy education for ELCC practitioners. Given that children learn best in a developmentally appropriate environment, providing information about the early capabilities of children may convince ELCC practitioners that early mathematics is developmentally appropriate. Accordingly, the survey results are being used in partnership with the Canadian Child Care Federation and the Canadian Language and Literacy Research Network (CLLRNet) to develop an evidence-based Resource Sheet that outlines children's early numeracy capabilities.

ELCC practitioners also need information about fun and effective early numeracy activities that will increase children's participation, encourage children to initiate these activities, and minimize opting out. Child initiation is a key belief of over one-third of the respondents, and many say they no longer use worksheets or flashcards, because they do not see these materials as developmentally appropriate. Many respondents suggested they want to learn about other age-appropriate early numeracy activities beyond counting, and that the activities assessed in the survey had given them ideas about what they could do. Because the less-experienced practitioners are least knowledgeable about age appropriate early numeracy activities, materials directed at college-level pre-service programs would have the most impact.

This survey of Canadian early learning and child care practitioners highlights two key opportunities to improve the state of early numeracy education in Canada. First, because ELCC practitioners are aware that they need to acquire knowledge about early numeracy, and that they have few opportunities to address that need, targeting pre-service and in-service training about children's capabilities will open the door to heightened attention towards children's numeracy development. Second, many practitioners in the field, are eager to acquire more knowledge about developmentally-appropriate activities covering the range of early numeracy – from arithmetic to measurement. Resources to address both of these opportunities are in development in partnership with the CCCF and CLLRNet.

Early Learning Survey Summary: Characteristics of clusters of survey participants by beliefs, knowledge and practices.			
	Child-Initiated Cluster	Moderate Cluster	Adult-Guided Cluster
Size of Cluster	n = 305	n = 297	n = 164
Shared Belief	Social & Emotional growth is the primary goal.		
Defining Beliefs	All activities should be child-initiated.	All activities should not be child-initiated.	All activities should not be child-initiated.
	Children should be allowed to opt out of numeracy & literacy activities	Children should not be allowed to opt out.	Children should not be allowed to opt out.
	Preparation for school is not the most important goal.	Preparation for school is not the most important goal.	Preparation for school is the most important goal.
Knowledge of children's early numeracy capabilities			
	Tend to think kids are not capable until older		Tend to think kids are capable at younger ages
Knowledge of Early Numeracy	Most feel knowledgeable, but many do not	Most feel knowledgeable, but some do not	Almost all feel they are sufficiently knowledgeable
Math Confidence	Tend to avoid math	Tend to avoid math	Confident about their math skills
Importance ratings for Simple Arithmetic	Not really important before Grade 1	Not really important before Grade 1	Important before Grade 1, but not as important as reading
Early numeracy activities with children	Play some counting games	Play some counting games	Frequent counting games and some quantities & early arithmetic
Recommendations	Target resources on children's capabilities first	Provide resources on children's capabilities and activities	Provide resources on full range of early numeracy

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