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Preschool programs

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Synthesis

How important is it?

Preschool programs provide early childhood education and care for children from various cultural and socioeconomic backgrounds in the years prior to their entry into Grade 1. Settings typically include schools, nursery schools, childcare centres and private homes. Since the middle of the 20th century, preschool programs have been increasingly widespread given the recognition of the importance of learning during early childhood when brain development is very rapid. One of the important functions of preschool programs is to help children acquire learning-related skills, such as the ability to express thoughts, adapt behaviours to situational demands, control impulsivity, show curiosity, remain concentrated and be socially competent. As such, school readiness is not only about teaching children basic language and mathematics skills, but is also about promoting self-regulation. Although beneficial for all children, these early childhood learning opportunities are especially important for children in disadvantaged groups as they play a critical role in reducing the impact of negative early experiences and in redirecting their development into a more productive trajectory. Accordingly, preschool programs can help to reduce the educational gap between children from vulnerable and more affluent families.

What do we know?

Several cognitive and socio-emotional benefits are associated with participation in preschool programs. Not only do they tend to increase children's intellectual abilities, positive social behaviours, school commitment, and their likelihood of graduating from high school, but they also lower children's likelihood of repeating a grade and of engaging in antisocial behaviours during their adolescence. These long-lasting positive impacts are increasingly recognized across both developed and developing countries (e.g., Bangladesh, Uruguay), and are mostly found in high-quality preschool programs characterized by two critical components: a) an effective curriculum (i.e., the content of what is taught to children) and b) a positive classroom environment that increases children's extrinsic motivation to learn. Curriculum is central to supporting and strengthening children's learning and development. Yet, because children's academic functioning interacts with other factors (e.g., children's temperament, family background and cultural tradition), preschool programs that rely on custom-designed curriculum

tend to provide better outcomes as they integrate different types of approaches and take into account children's emerging aptitudes. Along the same lines, learning is fostered in an environment characterized by positive student-interactions. When children feel competent, identify with their teacher and receive appropriate feedback from them, they tend to be more motivated to learn.

Examples of preschool programs that are effective at promoting long-lasting benefits include Head Start, PATHS and Tools, among others. The Program for Alternative Thinking Strategies (PATHS) focuses on promoting self-regulation in children by a) establishing a positive classroom environment with rules and routines; b) teaching children ways to self-soothe, cool-down, and problem solve; and c) modelling prosocial behaviours (e.g., helping, sharing and turn-taking). Similarly, the Tools of the Mind (Tools) is a preschool program intended to promote academic functioning and self-regulation among children from vulnerable families by emphasizing problem solving in small groups, peer collaboration in play, social rules through memory aids and sociodramatic play.

What can be done?

To advance children's development, preschool programs should promote learning-related strategies, rely on an effective curriculum and be comprised of qualified preschool teachers. Several educational strategies can be implemented within preschool programs to promote children's learning-related skills. For example, in order to bridge the gap between other- and self-regulation, children are encouraged to use private speech to verbalize their objectives and to evaluate their performance. It is also recommended that teachers model a few situations that involve self-regulation (e.g., looking away from an attractive reward, holding hands under the table) and provide memory aids to symbolize social rules. Furthermore, a useful strategy to promote creativity, comprehension and peer cooperation is to engage children in collaborative play, problem-solving activities, pretend play and sociodramatic play. Pretend play allows children to negotiate what they have to do to coordinate their roles and make choices. Similarly, sociodramatic play helps children to imagine other's state of mind and to display different emotions as they are switching characters' roles. Overall, effective educational strategies are required in early education programs to promote children's emotional, behavioural and attention self-regulation.

In addition to emphasize learning-related skills, high-quality preschool programs should have a good curriculum.Itmust be structured enough, while giving enough flexibility to allow for the different needs of children and their families. Generally, curricula are most effective when a) children are active and cognitively engaged in their learning; b) instructional goals are clear; c) teachers have positive and meaningful interactions with students, in turn allowing them to track children' progress and make the necessary changes; d) what is taught builds on children's prior learning; and e) it is comprehensive.

Finally, preschool teachers should receive an adequate training to become sensitive to children's needs, rules and routines and to the socio-emotional climate. As part of their training, they should develop the capacity to contribute to children's cognitive and social development and to reach out to parents to make them full partners of children's early education.

Preschool Programs: Effective Curricula

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Introduction

High quality early care and education has been associated with short-term and long-term cognitive, social, and emotional benefits for young children's development. When quality is discussed, it is typically measured by two dimensions: (1) *process* variables (e.g., the nature of children's interactions with adult caregivers) and (2) *structural* variables (e.g., the characteristics that can be regulated by policy and that create beneficial conditions for children's development, including adult:child ratios, group size, and teacher training).[1,2] Curriculum – or the content of what is taught to children – cannot be overlooked; rather, it is a foundational fulcrum on which quality pedagogy rests.

Subject

Despite its centrality to quality, curriculum has been entangled and often confused with allied issues (i.e., beliefs, learning theories/pedagogies, and skills/standards). Yet, curriculum is different from these constructs. For example, most contemporary curricula reflect three guiding principles or beliefs about young children's learning that are manifest in, but distinct from, curriculum: (a) children are competent and eager learners whose natural curiosity yields rich learning trajectories; (b) children learn in an integrated way, so that specific subject area learnings (e.g., math, science, language) best take place within the context of child-generated experiences (e.g., cooking, gardening, constructing); and (c) children need exposure to all domains of development – physical and motor, language, cognitive, social and emotional – so that no single domain takes precedence over any other.[3,4]

Curriculum is also different from, but closely linked to, learning theories and pedagogies, which may lead to different curricular strategies. Behaviourist theories of child development often lead to didactic models of direct instruction in which teachers lead learning by presenting discrete facts to large groups of children. Maturationist theories advance pedagogy and curricula that enable children to direct their own learning and learn at their own pace. Constructivist theories

espouse pedagogy wherein children are active partners with their socio-cultural environment, including teachers and peers.

Finally, curriculum is different from, but supportive of the enhancement of, children's skills and behaviours. Curriculum is intended to encourage learning processes (e.g., attention, observation), cognitive skills (e.g., reasoning, comparing/contrasting, classification), and the acquisition of specific information (e.g., the names of numbers and letters of the alphabet). In this sense, curriculum is sometimes confused with standards or expectations of what children should know and do.

Curriculum, then, must be clearly understood for what it is and for what it uniquely contributes to early care and education. Curriculum is the content of what is taught and what is learned.

Problems

Several broad issues continue to complicate curriculum design, implementation, and evaluation. First, definitional ambiguity persists regarding the distinctions between curriculum, curriculum frameworks, and pedagogy. Second, the actual desired outcomes from curricula differ, with some privileging content-specific foci and others adopting a holistic orientation. Finally, and in light of the two former issues, it is very difficult to evaluate the effectiveness of curricula given that its effects are integrally related to social and contextual factors, including family background, social class, cultural traditions, and the qualities of the classroom teacher, and the nature of the pedagogy used to advance the curriculum.[3,5]

Research Context

Amidst the quest to address these challenges and to achieve better outcomes for young children, research on curriculum thrives. One major area of inquiry focuses on the comparative effectiveness of content-specific vs more holistic curriculum, with some findings strongly supporting a holistic orientation that embraces children's physical, social, emotional, linguistic, and cognitive development and supports overall learning and development. Simultaneously, research also supports content-specific curriculum as an elixir of school readiness skills (i.e., literacy and numeracy skills).[6-8] The scope of curriculum research is also expanding to include a focus on how children approach learning and their executive functioning. Recent studies examine the relationship between curriculum and familial, environmental and contextual variables including: (i) the importance of race, ethnicity, and gender as they impact learning and

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development; (ii) the cultivation of diverse environments that honor family values, cultures, and languages; (iii) the use and impact of digital technologies on children's development; (iv) the development, support, retention, and compensation of the workforce; and (v) the impact of systemic variables (e.g., governance, funding, and accountability) on the quality, equitable distribution, sustainability and efficiency of services. Finally, new approaches to research are being manifest, with increasing attention being accorded qualitative and mixed methods. These shifts in how curriculum is studied reflect widespread recognition, from practitioners and policymakers alike, that children's learning must be situated and understood within a broader context of families, community, teachers, learning environments, organizations, and systems.[9-12]

Recent Research Results

While data have not yet fully addressed the range of issues noted above, progress related to curriculum and pedagogy are not only being made, but are also yielding notable findings regarding the conditions under which children learn best. Children's learning and development is enhanced when:[3,5,6-21]

- ***Children are active and engaged***. Children learn best by exploring and thinking about the world around them. As such, children need to be active in their learning, not just cognitively, but also physically, socially, and artistically. Effective curriculum ensures that important concepts are taught through projects, every day experiences, collaborative activities, and an active curriculum.
- ***Goals are clear and shared by all***. Curriculum goals should be clearly defined, shared, and understood by all adults invested in children's learning (e.g., families, teachers, program administrators). The curriculum and related instructional strategies should be designed to help achieve goals in a unified, coherent way.
- ***Teachers have frequent****, meaningful interactions with children*. As already noted, curriculum and the content of what young children need to learn, know, and be able to do is closely linked with pedagogy and how such content is delivered. As a consequence, curriculum implementation relies primarily on teachers and the nature of teacher/child interactions. Teachers' engagement with children also allows them to regularly assess each child's progress and make adjustments in the classroom as necessary. Effective pedagogical and assessment strategies rely to a large extent on teachers' experience levels and educational backgrounds. To support effective teaching, curriculum should be linked to

on-going professional learning for teachers.

- ***Curriculum is evidence-based***. The curriculum should be based on evidence that is developmentally, culturally, and linguistically relevant for the children who will experience the curriculum. It should be organized around principles of child development and learning. When subject-specific curricula are adopted, they should also meet the standards of relevant professional organizations (e.g., the National Council of Teachers of English or the National Council of Teachers of Mathematics).
- ***Curriculum builds on children's prior learning and experiences***. The content and implementation of the curriculum should build on children's prior individual, age-related, and cultural learning and be inclusive of children with disabilities. In addition, curriculum should support the knowledge that children gain from their families and communities and support children with home languages other than English in building a solid base for later learning. Effective curricula offer guidance, adaptations, and specific strategies to differentiate teaching and classroom activities according to the characteristics and backgrounds of the children.
- ***Curriculum is comprehensive***. Curriculum should encompass all areas of development including children's physical health; well-being and motor development; social and emotional development; approaches to learning; language development, and cognition and general knowledge. Rather than adopting a didactic, school-based approach in which each subject is taught distinctly and at separate times, curricula in early care and education should explicitly integrate learning across domains.
- ***Curriculum is aligned with learning standards and appropriate assessments***. Increasingly, policy-makers and practitioners alike are concerned with improving children's learning experiences. This concern is manifest in the increased attention to a systematic approach to accountability that sets specific learning outcomes (i.e., early learning standards), guidance on what content to deliver to young children (i.e., curriculum), and assessment procedures that document children's progress. However, attending to each independently is insufficient; effective curriculum is well aligned with standards and assessments.
- ***Curriculum frameworks exist and are designed to be locally contextualized***. Internationally, researchers and policy-makers have paid increasing attention to *curriculum frameworks* as key policy levers to develop and guide quality curriculum. While these

documents are *not* accountability measures, they articulate broad, overarching developmental agreements that bind multiple providers under a common vision. Effective curriculum is grounded in the guidelines of a framework, but must also be flexibly individualized or localized to context.

- ***Curriculum is flexible and honors children's unique cultural contexts***. On a national or sub-national scale, this means that curriculum is culturally flexible so that it enables teachers to tailor pedagogy and learning experiences to the children and their communities. On a global scale, this manifests as a careful balance among cultural paradigms, particularly in the face of heightened Western hegemony in early childhood research and standards.
- ***Underlying early childhood systems are effectively functioning***. For curriculum to translate effectively to the classroom, the underlying early childhood *system* must also be effectively functioning. Components of an effective system include subsystems like a supported workforce; community and family engagement; comprehensive governance; sustainable funding mechanisms; robust data infrastructure; and high-quality pedagogy. For instance, in order for teachers to confidently adapt and enact curriculum, they must be well-trained and compensated; in order for curriculum to address children's needs, adequate child and program-level data must be available. Although the ways in which an early childhood system manifest will vary by context, effective systems universally require that all its components be equally supported.

Conclusions

Curriculum, or the content of what children learn, is central to supporting and strengthening young children's learning and development because it is the "front line" of children's experiences. Curriculum is different from beliefs about children, pedagogy, learning standards, and children's skills. Nonetheless, curriculum is central not only to the knowledge and skills children gain, but also to the application of particular pedagogical approaches and to the nature of teacher/caregiver-child interactions. With increasing numbers of children in early care and education programs, effective curriculum is crucial. Curriculum is also distinct and strengthened when used in combination with curriculum frameworks. In the face of increased globalization, curriculum must be guided by frameworks that build consensus on quality, be flexible to individualize, and honor diversity.

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Implications

Given the diversity of young children in early care and education programs, it is unlikely that the field will come to consensus on the superiority of a single specified curriculum, even though a general consensus might be reached around the elements associated with a curriculum framework. A framework would rely on a balance between a clearly defined structure that impacts all children and flexibility that allows for individualization for children, families, cultures, and classrooms. Moreover, next generation research must discern which pedagogical approaches produce educationally meaningful effects in which domains of development, for which children, under what social conditions, and with what kinds of professional preparation for teachers. Beyond embracing the research agenda, curricula must be distinguished from curriculum frameworks, just as pedagogy is distinct from curriculum.

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Preschool Programs for the General Population

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Introduction

There are well-known small-scale randomized controlled trial (RCT) studies from the US documenting the benefits of curriculum-led experimental preschool programs for long-term educational, occupational and social outcomes for disadvantaged children.[1] Additionally, a larger-scale quasi-experimental study in Chicago found similar benefits up to age 28 of sustained early education in terms of improved education, socio-economic status, health and crime for a disadvantaged population.[2] Such programs are cost-effective with groups at high risk for poor outcomes, in that the savings outweigh any costs.[3] Nevertheless, besides benefits for disadvantaged groups there is strong evidence that preschool education, whether specialized or routine provision, can be beneficial for the general population.

The Organisation for Economic Cooperation and Development (OECD) examined educational attainment data for 65 countries, finding that literacy at age 15 was strongly associated with preschool participation in countries where a large proportion of the population use preschool, where preschool is for more months, and where there were measures to maintain the quality of preschool.[4] They concluded that widening access to preschool can improve performance and equity by reducing socioeconomic disparities, but also importantly noting that this will be the case only if extending coverage does not compromise quality.[4] A meta-analysis of 125 studies concluded that preschool was associated with substantial effects for both cognitive and socio-emotional outcomes often through to adulthood, and educationally-oriented programs appeared to have larger effects.[5]

A more recent comprehensive review has delineated how a range of factors affect the influence of early childhood education and care (ECEC) upon child outcomes.[6] Studies of population-representative US samples reported benefits for school readiness of prekindergarten experiences,[7,8] greater if preschool started at 2 years of age.[9] Similar evidence also exists in the UK[10,11] and the effects are long-term with improved qualifications, employment and earnings in

adulthood.[12] In France, école maternelle provides universal, free, preschool education from age three. During the 1960s and 1970s large-scale expansion in France enrollment of 3-year-olds increased from 35% to 90% and of 4-year-olds from 60% to 100%. Analysis of state-collected data revealed sizable and persistent effects indicating that preschool helped children succeed in school and obtain higher wages in the labor market, with greater effects for children from less advantaged backgrounds.[13] Similar population-wide evidence has been found from national data in Switzerland where preschool expansion was associated with improved intergenerational educational mobility, with children from disadvantaged backgrounds benefiting most.[14] Further evidence comes from the expansion of preschool education in Norway during the 1970s, where using national datasets and examining differential local implementation found that preschool participation was associated with strong benefits for later educational and labor market outcomes across the population.[15]

More recently, in the US a study of children who attended New Jersey's public preschool program found long-lasting educational benefits for a population of largely black and Hispanic children. The effects persisted until age 16 and were larger for 2 years than 1 year of the preschool. Grade retention was significantly lower and special education placements were reduced with preschool participation.[16] Similarly, a study in Oklahoma found persistent benefits on math attainment and grade retention through middle school.[17]

Developing countries

Most research on ECEC has occurred in developed countries. However, some research has focused on the potential for ECEC to improve general population outcomes for developing countries. Sometimes the preschool program is coordinated with a health and/or nutrition program, and such programs appear to be very successful.[18] Examples of the benefits of preschool education has been found for several developing countries across the globe. For example, preschool was found to boost primary school achievement in Bangladesh,[19] with similar results reported in a review of studies from ten countries.[20] With the expansion of preschool provision in Uruguay comparisons were possible of a) siblings with and without preschool and b) regions varying in preschool expansion. The study revealed clear benefits in terms of academic achievement from preschool up to secondary school.[21] Similar analyses in Argentina found that one year of preschool was associated with primary school attainment increases by a moderate but important degree.[22] Also, a study in Chile showed that preschool attendance starting in the first two years of life had a positive impact on cognitive skills, academic outcomes and self-

regulation.[23] A review of research in developing countries[24] concluded that increasing preschool enrolment is amongst the most effective ways of improving child outcomes, with a very favourable benefit-to-cost ratio.

Quality

The long-term benefits are not evident in all research with some studies finding that children who did and did not attend preschool programs converge on educational measures after some years,[25] but there are discrepancies amongst studies. Some studies find persistent effects when preschool and later school education is high quality.[26] Others find persistent effects for children whose alternative learning environments are not conducive to developmental progress.[27] While persistent effects are the most common finding, quality is of relevance.[17] Critically, in experimental intervention studies[2,3,28] the quality of the preschool was high. General population studies from the US[29] and England[10,11] have provided evidence on preschool education with greater variability in quality and indicate that the quality of universal preschool is influential. For example, in England, controlling for background influences, quality as measured by standardized observations, revealed effects for literacy and numeracy that were important for later educational progress, with low-quality preschool having virtually no beneficial effect.[10,11] The beneficial effects of high quality preschool education on educational achievement and social development have been found up to age 18 in this English study.[11] Similar results were obtained in Northern Ireland; children who attended high quality preschool were 2.4 times more likely to attain the highest grade in literacy at age 11, and 3.4 times more likely in mathematics, than children without preschool.[30] Looking at evidence across public preschool programs in five US states with adequate resourcing and high quality programs (Maryland, Massachusetts, New Jersey, North Carolina, and Oklahoma), there were positive effects on educational attainment which was in contrast with null effects for programs in other states without evidence of high quality provision.[31] Thus, it could be concluded that high quality programs produce benefits but poorly implemented programs may have limited or no effects.

Effectiveness

Preschool experiences can improve children's longer-term executive functioning,[32] linked to enhanced cognitive and social-emotional outcomes. Similar long-term effects can be seen for specific areas of educational attainment such as mathematics,[10,30,33] scientific thinking[34] and literacy.[11,30] This is consistent with the proposition that later cognitive and non-cognitive skills

build upon skills learnt in early childhood, and greater early learning can put children on a more beneficial developmental trajectory. Thus, investment in early childhood education can result in greater benefits per unit than investment in later childhood. Similar propositions include those that preschool education, through improving both cognitive skills in language, literacy, and math as well as socio-emotional skills such as self-regulation, motivation/engagement, and persistence, can improve children's ability to maintain a positive academic trajectory.[35] The size of such preschool effects upon subsequent development has been debated often and a meta-analysis of 22 high-quality experimental and quasi-experimental studies conducted between 1960 and 2016 found that, on average, participation in preschool education leads to statistically significant reductions in special education placement (d = 0.33 *SD*, 8.1 percentage points) and grade retention (d = 0.26 *SD*, 8.3 percentage points) and increases in high school graduation rates (d = 0.24 *SD*, 11.4 percentage points).[36] Such results support the proposition that preschool education can reduce later education costs and also promote child well-being.

Determining Causality

Randomized controlled trial designs are generally not feasible with preschool provision for the general population, and non-experimental designs are the norm. Hence it is possible that the associations found between preschool experience and development, reflect selection effects. These issues have been discussed extensively,[37] and while it remains possible that unmeasured variables are the basis of a selection effect (omitted variable bias) the interpretation that associations are the result of casual effects of preschool experiences is strengthened by the inclusion of statistical control for many possible basis-for-selection covariates, reflecting child, family and sometimes neighbourhood characteristics, as for example in the EPPSE (effective preschool, primary & secondary education) study.[10,11]

Another approach to this problem is the use of change models. If differences exist prior to preschool experience this would support the selection effect interpretation; conversely if developmental differences emerge after preschool this supports a casual interpretation. As preschool experience has been found to be not only associated with post-preschool development, but also with enhanced progress over the preschool period,[38] this further supports a casual interpretation. Similarly, "difference in differences" approaches have supported the beneficial effects of preschool education, as in a study exploiting variation in preschool provision across birth cohorts and municipalities amongst Norway's population.[39] Another strategy is the regression-discontinuity design. Comparing "young" kindergarten children who had just

completed preschool to “old” preschool children just beginning preschool, the results clearly indicated preschool effects upon school readiness test scores.[40]

Other evidence supportive of a casual interpretation of preschool effects comes from a study of twins.[41] Longitudinal data from a nationally-representative sample over 600 monozygotic and dizygotic twin pairs shows the contributions of genes, shared environment and non-shared environment to cognitive development for children varying in preschool experience. Attending preschool was associated with reductions in shared environmental influences on academic skills at kindergarten entry and was prospectively associated with reduced family-level influences on academic skills. Before preschool the contribution of shared environment influences on cognition was similar for preschool and non-preschool groups but after preschool, shared environment influences were 43-47% of variance for the preschool group, while for the non-preschool group they were 72-83% of the variance.

In summary the evidence overwhelmingly supports a causal interpretation of the long-term effects of preschool education.

Research and Policy

Comparing data from before and after post-policy changes indicates that policy can improve preschool quality and reduce variation amongst the population.[42] In countries where policy has improved leading to universal coverage of preschool education and reduced variation in preschool quality, the effects of preschool education and particularly preschool quality effects upon child development are less apparent, as appears to have happened in the UK,[43] and possibly in Norway,[39] by largely eliminating poor quality with universal state-funded and monitored provision. This evidence of reduced effects for preschool education, when variation in provision and quality of preschool education amongst the population is reduced, can be interpreted as good news in that apparently most of the population are benefitting from better quality preschool experience.

The overwhelmingly positive evidence of the benefits of preschool education has increased interest in the universal preschool provision to improve school readiness and later educational attainment and subsequent social, economic and occupational success.[3,44] Indeed some have argued that preschool experience is critical for children's future competence, coping skills, health, success in the labor market, and consequently the social and economic health of the

nation.[45] In a technologically sophisticated world a population's educational competence is likely to be increasingly important for a nation's economic development. Hence preschool education benefits not only disadvantaged groups but advances educational and social development for all, and becomes part of the infrastructure for a nation's economic and social development. This message is increasingly being heeded by governments. In France, école maternelle has proved so valuable for the country as a whole that from 2019 it was made compulsory for all French children over three years of age to attend until the start of school (https://www.education.gouv.fr/l-ecole-maternelle-11534), and France became the first country to integrate preschool education into a compulsory education system. While in other countries, notably the Nordic countries, UK and others, preschool education, while not compulsory, is almost completely universal resulting from government funding of preschool facilities. This means that research in such countries can examine variations in preschool education, but comparing preschool versus no preschool attendance is not longer an option.

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Preschool Programs for Children in Disadvantaged Families

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Introduction and Subject

Preschool programs are purposeful arrangements of recurrent activities that provide care and education to children in the years before they enter school. While “preschool” logically encompasses the entire period from birth to school entry, it sometimes refers specifically to the year or two before school entry, which is kindergarten entry for five-year-olds in many places. Like school programs, preschool programs typically take place in schools or centers, but can take place in private homes as well. They can be solely for the purpose of educating children or may also provide care for them while their parents are working or in school themselves.

Families vary in the advantages available to their children. Their advantages or disadvantages are largely due to families’ socioeconomic status, which is largely determined by parents’ education, employment, earnings, and wealth. Some preschool programs, such as Head Start in the U.S., are intended to compensate for the disadvantages of children from families of low socioeconomic status.

Problems and Research Context

Preschool programs have become more widespread since the middle of the 20th century for two reasons. One is the worldwide movement of mothers of young children into the work force. The other is widespread knowledge of the accumulating evidence of the value of good early childhood education from recent research on the development of the human brain and evaluative research on model preschool programs for children in disadvantaged families. Neuroscience research has found that the brains of young children raised in high-toxic-stress settings are visibly less developed than the brains of young children raised in low-toxic-stress settings and that children’s brains are much more active from ages three to seven than in subsequent years.[1]

Recent Research Results

Evaluative program research has found a variety of important effects of model preschool programs on participants from early childhood into adulthood.[2] These studies have combined rigorous design, long-term study, and low rates of missing data to arrive at evidence that high-quality early childhood program experience has important positive long-lasting effects on participants which result in substantial economic return on investment.

- The HighScope Perry Preschool Study randomly assigned 123 poor children to participate in a high-quality preschool program at ages three and four or to no preschool program and followed these study participants through age 40. The program had teachers with college degrees, an intentional child development curriculum, substantial engagement with parents, and ongoing assessment of program implementation and child performance. The study found that this program had strong positive effects on participants' intellectual abilities, school achievement and commitment, high school graduation, adult earnings and employment, and avoidance of criminal activity. Economic analysis found that the program cost $10,917 per child per year in 2011 dollars (converted from the 2000 dollars reported) at a 3% annual discount rate, and provided an economic return to society of $16.14 per dollar invested.[3]
- The Carolina Abecedarian study randomly assigned 111 infants averaging 4.4 months of age from poor families, to a special program group or a typical child care group that used the prevalent child care arrangements in homes and centres. [4] It was found that this high-quality child care program for children from infancy to school entry improved participants' intellectual performance and school achievement. Fewer program participants repeated a grade or required special services or became teen parents; and more of them graduated from high school and more attended a four-year college. Economic analysis found that, in 2011 dollars discounted (converted from the 2002 dollars reported) at a 3% annual discount rate, the program cost $16,530 per child per year and yielded benefits to society of $3.78 per dollar invested.[5]
- The Chicago Longitudinal Study compared 989 low-income children who attended the city school district's Child-Parent Centres to a comparison group of 550 of their classmates who did not attend these centres.[6] The centres provided a part-day preschool program to three- and four-year-olds. The preschool-program group surpassed the no-preschool-program group in educational performance and social behaviour, with lower rates of grade retention and special education placement and a lower rate of juvenile and adult criminal arrests and

a higher on-time high school graduation rate and higher annual income. Economic analysis found that, in 2011 dollars at a 3% annual discount rate, the program cost $6,155 per child per year and yielded benefits of $7.10 return per dollar invested.[7]

In the past few years, a new generation of rigorous short-term preschool studies, most randomly assigning children to the program or no-program conditions, has produced relatively disappointing results. These studies have looked at the effects of publicly funded preschool programs, either typical Head Start programs or special Head Start and other federally funded early childhood programs.

Two studies of nationally representative samples of Head Start programs deserve special mention. The Head Start Impact Study involved random assignment of children to Head Start or no Head Start. This study has provided results for entering three-year-olds and entering four-year-olds after one year in Head Start and through the end of first grade.[8] It found evidence of small to moderate Head Start effects a year later on children's literacy and social skills, but no evidence of cognitive or social program effects on children at the end of first grade. However, only 63% of the "Head Start group" and 50% of the control group were in Head Start by the end of the second year, raising the question of what was compared to what in this study. The Head Start Family and Child Experiences Survey[9] looks at a representative national sample of Head Start programs in the U.S. Relative to national norms, children made significant gains during their Head Start year in vocabulary, early writing skills, social skills, and reduced hyperactive behaviour. Head Start graduates showed further progress toward national averages during kindergarten.

Rigorous evaluations of several special Head Start and similar programs have found small program effects, examining the effects of the Early Head Start program;[10] the Head Start Comprehensive Child Development Program;[11] and the U.S. Department of Education's Even Start Family Literacy program.[12] A study of the effects of five state-funded preschool programs, using a regression discontinuity design, found statistically significant, meaningful effects on children's vocabulary, print awareness skills, and early mathematics skills.[13]

Curriculum is a critical component of preschool programs that has been studied empirically. Several preschool curriculum comparison studies that began in the 1960s have followed preschool participants for years afterwards. One study found that young people born in poverty experienced fewer emotional problems and felony arrests if they attended a preschool program

that used the child development-focused High/Scope model or a traditional child-centered Nursery School model rather than a teacher-centered Direct Instruction model.[14] This study and two other longitudinal studiesfound that children in Direct Instruction programs significantly outperformed children in traditional and other programs on various measures of intellectual performance during the program and up to a year afterwards, but then these gains faded out.[15] The evidence continues to accumulate that early childhood curriculum models can differ significantly in some of their effects on children.[16,17,18]

Conclusions and Implications

The evidence is clear that early childhood experiences can greatly influence people's lives, and model preschool programs can evoke such early childhood experiences. But it is becoming increasingly apparent that it is also possible to intervene in young children's lives in ways that do not tap this great reservoir of potential. Effective preschool programs need qualified preschool teachers who know how to contribute to children's cognitive and social development and do so. These teachers must reach out to parents and make them full partners in educating their young children. Many young children now attend preschool programs. Ensuring that all these programs have qualified teachers who know how to contribute to young children's development and motivate parents to do the same will contribute greatly to the success and achievement of the next generation.

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Preschool and Learning-Related Skills

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Introduction and Subject

Early childhood programs in many countries are seeking to implement academic programs to prepare children more efficiently for reading and math instruction in elementary school. According to critics the emphasis on academic content and direct instruction might be at the expense of promoting important learning-related skills, such as executive functions and self-regulation. Recent evidence suggests that a narrow focus on academics in preschool education might be mistaken because when the demands on comprehension, creativity, independent work and cooperative learning increase in later years, children may not be sufficiently prepared to cope.[1,2] School readiness is more than the child's ability to sit still, hold a pencil and put on coat and shoes independently. It is also more than having acquired phonological awareness, letter knowledge and counting skills in preschool. School readiness includes important learning-related skills, such as the child's ability to express thoughts, wants and needs verbally, to control his or her emotions, and to show curiosity, concentration, persistence and social competence.[2,3]

Learning-related skills in early childhood

Depending on the research tradition, learning related skills are referred to either as executive functions, self-regulation ability, or metacognitive and meta-emotional skills, but these different concepts are clearly related.

Executive functions

Executive functions refer to systems in the brain that increasingly come to control information processing and behaviour in the course of development.[1,4] Commonly, three basic executive functions are distinguished: working memory (also called updating), inhibitory control and flexibility (also called shifting), but there is a debate whether these functions are already distinguishable in young children.[5] Working memory refers to the ability to hold a limited amount of information temporarily active for processing and updating. Inhibition refers to the ability to

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inhibit a predominant (but inadequate) response and to resist interference by distracting stimuli. Flexibility refers to the ability to switch between rules or strategies, and to change the mind-set. In addition, higher order executive functions are distinguished such as planning, monitoring and creativity. All executive functions share involvement of executive attention, a brain network that controls allocation of resources ("activation") to different information processing systems in the brain.[6]

Emotional self-regulation

Self-regulation refers to adapting behaviour to situational demands in view of important goals while inhibiting the impulse to obtain immediate rewards. Individual differences in delay-of-gratification have remarkable long-term predictive value.[7] Observing how young children cope with delaying gratification reveals the involvement of working memory (holding goal representations temporarily active), shifting attention (looking away from the attractive reward), and behavioural inhibition (holding the hands behind the back or under the table). Development of self-regulation in early childhood is related to the development of executive attention – the ability to deliberately shift attention to cognitions that can counter-act undesirable thoughts or actions and can motivate to desirable thoughts or actions.[6]

Self-regulation in learning

Self-regulation in the education tradition incorporates both general metacognitive knowledge of how to approach a learning task or a problem and domain-specific metacognitive knowledge of appropriate problem-solving strategies.[8] Also in educational approaches, self-regulation includes the ability to postpone immediate satisfaction to attain long-term goals, the ability to mobilize energy and to sustain attention, to resist distracting information and to shift flexibly between mind sets. Ideally, learning is driven by intrinsic motivation, that is, by an authentic interest in the subject matter and in the activity of learning, but truly intrinsic motivation may be rare among students. Internalized extrinsic motivation means that a student has come to attach positive emotion to educational activities, feels competent in learning and identifies with the teacher. Fostering this type of motivation might be an important objective for education and may strongly depend on positive social relationships with the teacher, a positive classroom climate, balance between student and teacher concerns, appropriate feedback and experiences of competence.[9,10]

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Self-regulation in Vygotskian theory

Self-regulation is also an important concept in Vygotskian theory where developmental progress from being regulated externally by others (e.g. parents, teachers, peers) to self-regulation applies to a broad range of skills, not just cognitive and emotional control, and captures how well a child integrates knowledge, skills and problem-solving strategies with goal-directedness, motivation, persistence, planning and control. The transition from other-regulation to self-regulation in Vygotskian theory involves observation, imitation, dialogue and co-construction through coordination of looking, gestures and overt negotiation. In instructional interactions with an experienced teacher, verbalized metacognitive thinking, for example planning, monitoring and switching, is modeled. Internalization of expert skills may involve an intermediate stage involving private speech, or "self-talk," that resembles the explicit metacognitive thoughts of the expert.[11] Self-talk and internalized speech are important tools of children's cognitive and emotional control.

'Hot' and 'cool' executive functions

Are control functions for cognitive behaviours ('cool' executive functions) and emotional behaviours ('hot' executive functions) related? And how does motivation influence learning? A study with preschoolers using assessments from the cool and the hot tradition suggests considerable overlap, with both cool and hot executive functions predicting early academic achievement.[12,13] A central role in cognitive and emotional control is attributed to executive attention. When adapting to situational demands, executive attention allocates resources to cognitive versus emotional processing. For example, the presence of strong emotional cues can hamper learning by withdrawing resources from cognitive processing,[14] whereas mild positive emotions and positive mood states may increase resources for cognitive processing and improve learning.[10,15]

Promoting learning-related skills

Early measures of executive functions and self-regulation predict academic achievement in reading and mathematics better than IQ[16] and also behavioural adjustment and well-being in the classroom, empathy, moral reasoning and prosocial behaviour.[17] Promoting learning-related self-regulation, therefore, should be a core objective in early childhood programs. Different approaches are possible: training of specific executive functions underlying self-regulation,

providing interaction settings that foster the transition from other- to self-regulation, and creating classroom practices that are conducive to self-regulation development.

Executive function training

Programs have been developed to foster executive functions in at risk preschool children with poor working memory or executive functions or attention deficit hyperactivity disorder (ADHD). Research shows sizeable effects of computerized training on executive functions if the difficulty level, or "working memory load," is adaptively increased, on nonverbal intelligence and on parent reports of self-regulation behaviour in children with ADHD, but evidence for transfer to academic achievement and classroom behaviour is not fully consistent.[18]

Settings that foster self-regulation

In the Vygotskian approach, early development of self-regulation is related to peer interaction in pretend play.[19,20] Pretend play requires children to establish a shared imagined world. They negotiate what to do, coordinate their roles and reconcile differing motives, decide on the global plan, while updating the plan as the play evolves. In more mature pretend play, children frequently switch between in-play talk and meta-play talk to coordinate their behaviours, showing metacognitive regulation. Sociodramatic play is a variant of pretend play in which children become part of the symbolized order and change their identities as they take up roles. Sociodramatic play requires imagining others' state of mind and allows trying-out emotions and appears to be related to emotional self-regulation.[21]

Using knowledge about learning and monitoring the process of learning in order to self-regulate learning behaviour occurs already with three- to five-year-olds, especially in situations allowing children choice and control of the level of challenge.[22] Analysis of videotaped interactions revealed several factors promoting metacognitive self-regulation. More metacognitive self-regulation occurred when children worked in small groups on tasks requiring a plan. Involvement of the teacher increased metacognitive self-regulation. In unsupervised small group activities, children showed high levels of shared metacognitive and meta-emotional regulation, using emotion knowledge. In solitary activities, enhanced emotional self-regulation –to stay motivated and persistent– was observed. Making preschool teachers aware of metacognitive strategies in the planning, execution and evaluation phases of learning activities influenced preschoolers' metacognitive knowledge of how to approach learning tasks, how to regulate the

learning process and how to evaluate outcomes.[23]

Classroom practices

High preschool classroom quality promotes a range of child outcomes, cognitive as well as social and behavioural,[24] and the development of executive functions and self-regulation appears to be an important mediating link.[25] A randomized controlled experiment[26] studied the joint effects of the Program for Alternative Thinking Strategies (PATHS) and an interactive storybook reading intervention added to a regular Head Start curriculum. PATHS is intended to increase emotional self-regulation, social problem solving skill and social competence. The main components are: 1) establishing emotionally positive classroom rules and routines; 2) lessons in self-soothing, self-rewarding, cooling-down and social conflict solving; 3) teacher modeling of helping and sharing behaviour, turn-taking and emotional coaching; and 4) storybook reading focusing on dialogue and the use of open-ended questions and complex language. The intervention increased executive functioning in task behaviour and academic knowledge.

The Tools of the Mind (Tools) program[27] stands in the Vygotskian tradition. It is intended to promote academic skills for preschoolers from disadvantaged backgrounds, and uses instruction and interaction formats that support transition from other to self-regulation. The main components are 1) teacher-guided learning and problem-solving in small groups in which children are stimulated to verbalize their plans and evaluate the problem solving, 2) peer collaboration in play and problem-solving, with children alternating the role of tutor, 3) the use of memory aids symbolizing social rules, such as attentive listening and waiting for one’s turn; and 4) sociodramatic play to promote emotional self-regulation. A study with random assignment of 5-year-olds to either Tools or an academic-focus program, found Tools superior both in academic outcomes and in executive functions.[28]

The importance of allowing children initiative and control over activities is supported by findings on Montessori kindergartens, whose curriculum had an emphasis on student-chosen work and a mix of individual and small group instruction in academic and social skills. Children attended multi-age classrooms and classroom rules induced children to wait for their turn and to be considerate towards younger children. Due to a waiting list, three-year-olds, mostly minority children, were randomly assigned to Montessori or other preschools. At age 5, Montessori children outperformed controls in academic skills, executive functions, social competence, moral reasoning and creative skills.[29]

Conclusion

Early childhood education programs can help develop learning-related skills, in particular self-regulation and executive functions. Instructional activities with academic content can promote self-regulation by encouraging children to verbalize plans and evaluate their performance, with self-talk functioning as a bridge between external and self-regulation. Modeling metacognition and self-regulation by the teacher, providing memory aids and stimulating the use of private speech can support the transition from other- to self-regulation.

Allowing children choice and control of the level of challenge stimulates metacognitive awareness and metacognitive self-regulation. The use of collaborative play and problem solving activities, pretend play and sociodramatic play promote self-regulation in young children. Existing programs can benefit from rules and routines that improve the social-emotional classroom climate. Training teachers to become more sensitive to children's needs, to avoid negativity and to establish secure social relationships with children is also important. Explicitly addressing emotions, using stories with emotional content, providing emotion knowledge and demonstrating emotional self-regulation, improves emotional self-regulation.

To conclude, the issue is not abandoning academic content that includes rich vocabulary, world knowledge, insights in physical phenomena and in human mental and emotional life. The issue is mostly about pedagogical approaches, the ways of conduct in the classroom, the quality of the social relationships, children's choice of activities, the forms of interaction for children, and features and activities, such as pretend play, that specifically support memory, executive function and self-regulation development.[30]

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Preschool Programs: Effective Curriculum. Comments on Melhuish and Barnes, Kagan and Kauerz, Schweinhart, and Leseman

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Introduction

Canadian preschool programs offer organized environments to young children prior to entry into Grade 1. Preschool programs are early childhood education opportunities characterized by recurrent experiences that are central to supporting and strengthening young children's learning and development. The curricula of these programs form the "front line" of children's experiences – what is taught and what is learned.[1]

In Canada over 50% of children between ages 2 and 4 attend a preschool program.[2] Possible settings include child care centres, nursery schools, preschools, prekindergarten, junior kindergarten, kindergarten, child development centres, play groups and Aboriginal Head Start.[2] They may be offered as part of the public education system, non-profit or commercial organizations. A few preschool programs are offered by municipal governments or postsecondary institutions. At age 5, all children are entitled to a kindergarten or primary program offered as the first year of elementary schooling and approximately 95% of them participate.[2]

Canadians are joining others around the world in recognizing that children are young citizens who have a right to the best possible childhood and that includes opportunities to participate in early childhood education.

If early childhood education programs are to be equitable opportunities for all preschool children, they must pay attention to the context of young children's lives. Early childhood education programs are social experiences that guide children's learning about the world around them and must reflect differences in culture. The social context is a critical element to take into account in considering how children learn and develop. Family structure, social and economic characteristics, community influences, and ethnic and linguistic backgrounds are the context for

early learning. Making sure each child is welcome and each family has a sense of belonging are prerequisites to early learning.[3]

In the past few years, Canadian jurisdictions have followed several international jurisdictions in developing curriculum frameworks to support early childhood education.[4] The framework documents guide planning without enforcing a particular curriculum model or pedagogical approach. They share common design principles that echo research findings from the United Kingdom,[5] the United States,[6] New Zealand[7] and the Organization of Economic and Cooperative Development (OECD).[8]

Research and Conclusions

Edward Melhuish and Jacqueline Barnes[5] conclude that all children benefit from participation in high quality early childhood education programs from age 2.[9] Vulnerable and disadvantaged children may benefit more because they enter with fewer resources and assets, but children from more affluent families and well-resourced home learning environments also benefit. Evidence from longstanding preschools in France, Switzerland and Norway – expanded access to preschool programs since the 1970s – has demonstrated benefits for later educational and labour market outcomes.[5]

In the U.K., the Effective Provision of Preschool Education (EPPE) study in England followed a large sample of 3,000 children from preschool to school entry and into elementary and secondary school.[10,11,12] The sample included children in a range of early childhood programs as well as those who were at home full-time. The beneficial effects of preschool for all children remain evident at age 14 years. The EPPE study included related qualitative case studies that identified key elements that support effective delivery.[13,14] Cognitive and social development are viewed as complementary. Staffing includes strong pedagogical leadership and long-serving educators who have curriculum and pedagogy knowledge and expertise. A strong educational focus is evident and children experience a mix of child- and educator-initiative activities. Educator-child interactions involve sustained shared thinking and educators frequently provide formative feedback to children during activities. Learning activities are differentiated to meet individual needs and policies support self-regulation rather than a behaviour management approach. Parents are involved, particularly in working with educators to establish educational aims for their children.

Lawrence Schweinhart[15] of the High/Scope Education Research Foundation has been a lead researcher of the Perry Preschool Program Study since the 1970s. The goal of the Perry Preschool Program was to improve the development and learning of young children living in disadvantaged circumstances. The study was a randomized control trial of 123 children that has followed the participants through age 40. Schweinhart and his colleagues found stunning results and return on investment – $17.05 per dollar invested. The cognitively-oriented program developed for the Perry Preschool Program Study has grown into a large curriculum resource organization that supports curriculum development in programs in the U.S. and internationally, including Canada.

Schweinhart[15] points to the role of curriculum and its implementation as a critical element in the kinds of results that were found in the Perry Preschool Program Study and in two other model preschool programs: the Carolina Abecedarian study[16] and the Chicago Longitudinal Study of Child-Parent Centres.[17] All three programs were carefully monitored as part of the ongoing research initiative. They employed qualified early childhood staff, had extensive parent involvement components, and guided the implementation of well thought out, but different, curricula approaches.[18]

The recent avalanche of research about preschool programs drives a strong message that early childhood education can mitigate negative early experiences and redirect young children's development to more productive trajectories. Heightened awareness about early human development, particularly early brain development in setting the foundation for life long learning, behaviour and health[2] coupled with concerns about children's social, emotional and intellectual developmental difficulties at school entry,[19] has turned the attention of developmental and neuroscience researchers to what children do in preschool programs.

Paul Leseman[20] points out the emphasis many preschool programs place on academic curricula that are intended to prepare children for school. He proposes attention to a suite of learning-related skills often called executive functions that are an integral part of self-regulation.Leseman [20] notes that self-regulation involves attention, working memory, inhibition and shifting and higher order planning and monitoring, as well as the ability to adapt to new situations and challenges. He argues that these are the skills that children need to learn to acquire metacognitive awareness and the learning to learn abilities. Preschool programs can employ a pedagogocial approach that encourages children's choices, collaboration with each other and explicit awareness of their own learning and emotions. Pretend and sociodramatic play, problem-

solving activities, opportunities for risk and stories with emotional content provide experiences that contribute to emotional, behavioural and attention self-regulation.[21] Educators who are sensitive to children's needs and to rules and routines that improve the room's socio-emotional climate contribute to emotional self-regulation. Leseman[20] does not advocate abandoning curriculum content related to literacy, numeracy and inquiry in preschool programs. Rather he recommends ensuring that the content is embedded into environments and pedagogy that promote essential learning-related skills.

Economist James Heckman and his colleagues proclaim that "skill begets skill"[22] and that investment in early child development, particularly quality early childhood education pays back a high return on investment. Getting children on positive trajectories in Grade 1 is a proven strategy to improve the life chances of an individual's and a society's human capital. The real drivers are what Heckman calls "soft skill" or personality traits – perseverance, ability to attend and ignore distractions, conscientiousness and sociability.[23] These skills can also be viewed as self-regulation of emotion, behaviour and attention.

Canadian[24] and American[25] reviews of the pedagogy of play propose that children are independent agents who can have an active role in shaping their learning environments. The focus is on enriching and extending learning opportunities that emerge, based on the educator's knowledge of child development, observation and documentation of the child's activities, and the child's family and community context.

Implications for Policy and Practice

Canadian preschool curriculum frameworks exist along a continuum of adult-guided to child-directed approaches.[20] They include intentional and spontaneous opportunities for learning that may be child-directed or adult-guided. Most early childhood programs have elements of both child-directed play and adult-guided instruction, but it is the balance between the two that varies.

In more adult-guided approaches, early childhood educators set up the environment and select activities related to a set of learning outcomes or expectations – for example, Montessori, High/Scope, or Sesame Street. Kagan and Kauerz[6] and Schweinhart[15] point to the value of having a curriculum approach and direction in preschool programs that prepares children for success in their school years. They recommend a holistic, developmental approach, skilled early childhood

practitioners, clear and specific program and early learning standards. Their approaches are consistent with pre-primary approaches prevalent in the U.S.. Across Canada, kindergarten curricula follow a teacher-guided approach and are organized to encourage children's attainment of identified learning expectations.

In child-directed curriculum approaches, children's interests and emerging skills and aptitudes drive curriculum – for example, emergent curriculum and Reggio Emilia. Leseman[20] promotes an organized and planned curriculum direction and references specific, defined approaches, but he does not advocate a prescribed curriculum or predetermined learning expectations. Rather, he recommends pedagogical principles consistent with a child-directed approach that reflective practitioners can draw on to respond to a specific group of children. .

Child-directed curriculum decisions are driven by the interests of the children within the context of their families and immediate communities. The focus is on developmental goals, interactivity with educators and peers, and a high quality of life in the early childhood setting. The curriculum has broad orientations for children rather than prescribed outcomes. Goals may become less clear and there is less accountability in achieving these goals and little emphasis on assessment of children's mastery of skills. Broad goals are established for each child in consultation with parents and are informally evaluated through on-going observation and documentation unless further screening seems advisable. The acquisition of developmental skills is perceived as a by-product rather than as the driver of the curriculum.

The most effective curriculum is probably custom-designed for each preschool program based on an agreed upon set of design principles and knowledge about different types of approaches. The implementation of ready-made program models might be easier at first but they are usually less effective (in terms of children's outcomes) than programs that construct their own learning environments. Having a clear program direction and specific learning goals for children and families is more important than which program model is adopted. Putting together a custom learning environment is more effective than trying to transplant a particular curriculum approach.

The critical element that runs across effective preschool programs is a skilled early childhood workforce. Early childhood educators who are reflective and responsive practitioners are essential in establishing preschool programs as effective early learning environments.

Early childhood educators intentionally guide and construct opportunities to extend children's learning. Pedagogical strategies across the continuum from child-directed to teacher-guided approaches provide structure and direction for educators who support the development of capacities and skills while respecting a child's interests and choices. Effective educators use a repertoire of strategies that includes sustained shared thinking and guided learning; investigation and exploration; modelling and demonstrating; open questioning, speculating and explaining; and, explicit or direct instruction.

Preschool children can thrive in a variety of early childhood education program models with knowledgeable and responsive educators who are sensitive to their individual and collective learning dispositions. As Canada moves towards offering opportunities to all preschool children, program design will require continued commitment from educators, policy makers and families.

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