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Conceptualising Multilingual Infants' Language Learning in ECEC Through a New Ecobehavioural Model

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Abstract

As the number of multilingual children attending early childhood settings continues to grow, there has been an increasing focus on how to support their language learning experiences in early childhood education and care (ECEC) settings. This article proposes an ecobehavioural model for supporting multilingual infants' language development in ECEC settings, which is inspired by and builds on Vygotsky's cultural–historical approach, Bronfenbrenner's ecological theory and Ford et al.'s ecobehavioural model of early language development. By integrating these theoretical approaches, this conceptual article examines different levels of factors that impact the quality and quantity of educators' language input and interactions with multilingual infants in ECEC rooms. This paper introduces an ecobehavioural model comprising four levels: Level 1 focuses on the quality and quantity of educators' interactions with multilingual infants; Level 2 on educators' knowledge and practices of supporting multilingualism in ECEC; Level 3 on the environments and resources of supporting multilingual infants' learning in ECEC; and Level 4 concerns the policies that inform professional development and interventions to support multilingual infants in ECEC. The new model helps us understand how to support the quantity and quality of educators' language input and interactions with multilingual infants under the age of two in ECEC in a dynamic and holistic way. It can also be used to describe the current research gaps and identify directions for future research, practices and policy on supporting multilingual young children in ECEC settings.

Keywords: multilingual infants; language learning; early childhood education and care; ecobehavioural model; educators

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1. Introduction

Evidence suggests that there is a range of personal and social benefits of being multilingual (Bialystok, 2011). In this article, we define "multilingual infants" as infants who are exposed to both their home language and the majority language under the age of two. Meta-analyses reflect that multilingualism is associated with better executive control system and cognitive function (Adesope et al., 2010; Luk et al., 2011). Multilingualism is also linked with better academic skills in infancy and the prevention of declining brain function in old age, including protection against the severity of Alzheimer's disease (Schweizer et al., 2012). Multilingual education promotes critical thinking and creativity and is related to better job opportunities (García & Wei, 2021; Ginsburgh & Prieto-Rodriguez, 2011). However, multilingual families experience challenges in supporting their children's learning and

maintenance of their home languages alongside the majority language. Researchers have found, for example, that the focus of language learning shifts towards the majority language and decreases opportunities to maintain children's home languages when multilingual infants start to attend ECEC services (Verdon et al., 2014).

As multilingual children spend considerable time in ECEC settings in their early years, it is important to understand how educators can support their language learning, development and wellbeing in ECEC environments. While research has paid increasing attention to preschool-aged children in ECEC, less is known about how to support multilingual infants under the age of two. In addition, research on early multilingualism has focused largely on the home language environment, leaving a significant gap in knowledge about how ECEC contexts can best support multilingual infants.

Little is also known about how the support of multilingual learning in ECEC settings could best complement multilingual children's experiences at home and in the broader community. To support researchers in addressing this gap, based on a combination of theory synthesis and theory adaptation approaches, this conceptual article proposes an ecological model of supporting multilingualism in ECEC. Adopting an ecological perspective, this paper aims to explain how early childhood educators, parents, researchers and policy makers can support multilingual infants' language learning and development in ECEC environments The model offers a framework for examining (1) factors associated with the quantity and the quality of language environments in ECEC, (2) early childhood educators' knowledge, attitudes and practices on multilingual development, (3) contexts such as daily routines, activities and resources, and (4) policies that support multilingual development in ECEC. This conceptual paper aims to foster a deeper understanding of how ECEC can support early multilingualism in ECEC, and help early childhood educators, researchers and policy makers work together to create high-quality language environments for all children and advocate for educational equity in early years.

Theoretical Perspectives of Young Children's Language Learning

The ecobehavioural model of supporting multilingual infants in ECEC environments presented in this paper is grounded on Vygotsky's (1978) cultural–historical approach to human development and Bronfenbrenner's (2005) ecological theory. Vygotsky's (1978) approach emphasises that learning is a social practice that requires interactions with others, more mature members of the community who provide 'scaffolding' to support learning, and that social interaction is the foundation of human cultural and cognitive development. By interacting with others, children develop their knowledge about the objects and people around them in the world, their ability to communicate their thoughts and ideas to others, and their understanding of different cultural norms and values. Therefore, young children learn language by interacting with caregivers in various settings, such as home, ECEC or other community environments. Vygotsky's (1978) concept of a zone of proximal development (ZPD) emphasises that the scaffolding addressed to children should be adapted to suit their ages and developmental levels. In this paper, we propose a multi-level model of the factors that shape multilingual infants' learning.

The model proposed here also builds on Bronfenbrenner's (2005) ecological theory, which supports accounts of how infants' interactions with caregivers are shaped by a range of factors. These factors may influence the quality and quantity of social interactions and language input provided to children from the proximal levels to the distal levels. Bronfenbrenner's ecological theory of child development further provides a framework for examining the role of various environmental variables that contribute to language development (Bronfenbrenner, 2005; Ford et al., 2020). The integration of Vygotskian and Bronfenbrennerian perspectives contributes to a deeper understanding of what and how

multiple factors interact to shape multilingual young children's language learning through social interactions.

2. The Ecobehavioural Framework of Early Language Development

Inspired by Bronfenbrenner's (2005) ecological theory of child development and Vygotsky's (1978) cultural–historical approach, Ford et al. (2020) proposed a new framework, an ecobehavioural model of early language development, to address different variables that shape the quantity and quality of early childhood language environments across various settings (Ford et al., 2020). In this framework, language is conceptualised as a skill learned through social interactions in everyday practices. Interactions with others provide contexts for language learning opportunities, but the quality and quantity of interactions will vary.

There are four levels in Ford et al.'s (2020) ecobehavioural model. Level 1 proposes that both caregiver and child are active participants in interactions, which is the "key engine" of development (Ford et al., 2020). The caregiver provides an opportunity to interact and respond to the child during back-and-forth interactional turns, which initiate the conversation that can promote the child's response (Ford et al., 2020). In return, the child uses communicative repertoires and resources such as vocalisations, gestures, body and verbal language to initiate or respond to the caregiver. Research suggests that a high-quality social environment requires an engaging and responsive communicative partner, and speech that includes a rich vocabulary and complex structure (Hoff, 2006).

Level 2 of Ford et al. (2020)'s model stresses that caregivers' knowledge, beliefs and behaviours affect the quality and quantity of their interactions with young children. This level proposes that caregivers' knowledge and beliefs determine their communicative behaviours and talking styles during interactions. Therefore, it is vital to ensure that caregivers have sufficient knowledge on how to provide a high-quality language environment to interact with children. For example, parents with increased knowledge have been shown to provide more language input and conversations to support children's language development post-interventions (Suskind et al., 2013).

Level 3 emphasises that different activity contexts and learning materials provide opportunities for caregivers to engage children in conversations about different topics (Ford et al., 2020). Daily routines at home and other settings, as well as visits to zoos, libraries and museums, offer children opportunities to engage in conversations about specific topics with caregivers. In addition, conversations and interactions between young children and caregivers are facilitated by a variety of materials and activities, such as play, shared book reading, storytelling, nursery rhyme singing and games involving learning the alphabet/letters (Zauche et al., 2016).

Level 4, societal policies and practices are the most distal factors influencing adult–child interactions. However, they set the foundation for providing support to parents and educators regarding child learning and development (Ford et al., 2020). For example, policies of increasing parental leave provide parents more time to interact with their young children (Ford et al., 2020).

Adapting Ford et al.'s (2020) Model to Multilingual Infants in ECEC

As Ford et al.'s (2020) ecobehavioural model is a general framework that aims to describe all children's language development, it is currently unclear how it applies specifically to multilingual infants' experiences in ECEC contexts or multilingual children more generally. In other words, while Ford et al.'s (2020) model may provide useful guidance based on the evidence from typically developing monolingual children, it does not address how adjustments should be made based on multilingual children's different ages and developmental needs.

In addition, the concepts in each level of Ford et al. (2020) are largely drawn from the literature in home contexts. For example, the evidence discussed for Level 1 focused on parent–child interactions and the acquisition of vocabulary. Also, Level 2 was proposed to capture maternal education, SES, mothers' cultural background and interventions of parental knowledge. Given the complexity and unique characteristics of ECEC learning environments, it may be challenging to generalise the concepts at each level of Ford et al.'s (2020) model to ECEC contexts.

As the language environment in ECEC settings differs from that in the home (Degotardi, 2021), the model may need to be adapted to better suit the practice and policy context of the ECEC setting. For example, while Level 1 of Ford et al. (2020) largely focuses on the roles of the child and the parents, ECEC environments are more dynamic and often impacted directly by multiple factors (Degotardi, 2021), which go beyond the usual home variables such as maternal education and SES (further details are presented in Section 4). These elements in the current paper are placed structurally differently from Ford et al. (2020).

Motivated by the growing number of multilingual children attending ECEC services (Lampe et al., 2023), we build on Ford et al.'s (2020) work to propose an ecological framework tailored for multilingual development in ECEC environments. Table 1 indicates the differences between Ford et al.'s (2020) model and the current model.

Table 1. A comparison of Ford et al.'s (2020) model and the proposed model.

	Population	Context	Structure
Ford et al. (2020)	Monolingual children	Home	Nested hierarchy
The proposed model	Multilingual infants	ECEC specific	Dynamic flow

3. Methodology

This conceptual article follows the process of building a conceptual framework and theory adaptation (Jaakkola, 2020; Jabareen, 2009). Building a conceptual framework includes the following key steps: mapping the data sources; categorising the data; identifying and categorising concepts; and integrating concepts and synthesis (Jabareen, 2009). Theory adaptation is used for revisiting and changing the scope of an existing theory by combining it with other theories or perspectives, for example, expanding the existing theory by shifting the focus or the concepts of the theory to better align with the new research purpose. Building on Ford et al.'s (2020) ecobehavioural model of early language development, we reframe the concepts of each level and integrate pedagogical theories about supporting multilingualism (e.g., translanguaging) in ECEC contexts. Given the research focus of this conceptual paper, theory adaptation is well-suited to the research purpose. This conceptual article is drawn on existing empirical data from recent reviews of supporting multilingual development in ECEC contexts, young children's language learning environments, and translanguaging pedagogy (Degotardi, 2021; Pontier et al., 2020; Sembiante et al., 2023; Zheng et al., 2021, 2025). Through mapping the evidence from the literature, we identify and synthesise concepts at each level and ultimately develop the framework presented in this article.

4. Conceptualising Multilingual Infants' Language Learning in ECEC Through a New Ecobehavioural Model

'Emerging' multilingual children (i.e., in Australia, those who are still developing proficiency in English as well as their home language) have been found to be developmentally vulnerable at school entry, compared to their monolingual English and English proficient

peers (Lampe et al., 2023). With increasing numbers of multilingual children now attending ECEC services, the role that ECEC can play in supporting multilingual development, especially in very young children, has attracted attention. An evidence-informed framework is therefore needed to support early childhood educators to develop professional knowledge and practice that is tailored to supporting multilingual infants. This framework has the potential to provide a clear roadmap to understand the integration of theories and evidence-based practices that connect broader ecological theories of language development with the concepts of multilingualism and infant pedagogy in ECEC environments.

The following ecobehavioural model was adapted from Ford et al. (2020) through the consideration and synthesis of the literature specific to multilingual development in ECEC settings. Developed to be sensitive to both population (i.e., multilingual infants) and context (i.e., ECEC environments), this model can offer insightful knowledge to inform policy makers, early childhood educators and researchers in creating a high-quality language environment for multilingual infants (see Figure 1). The model can also map the current evidence on supporting multilingual infants and identify current research gaps to inform future research directions.

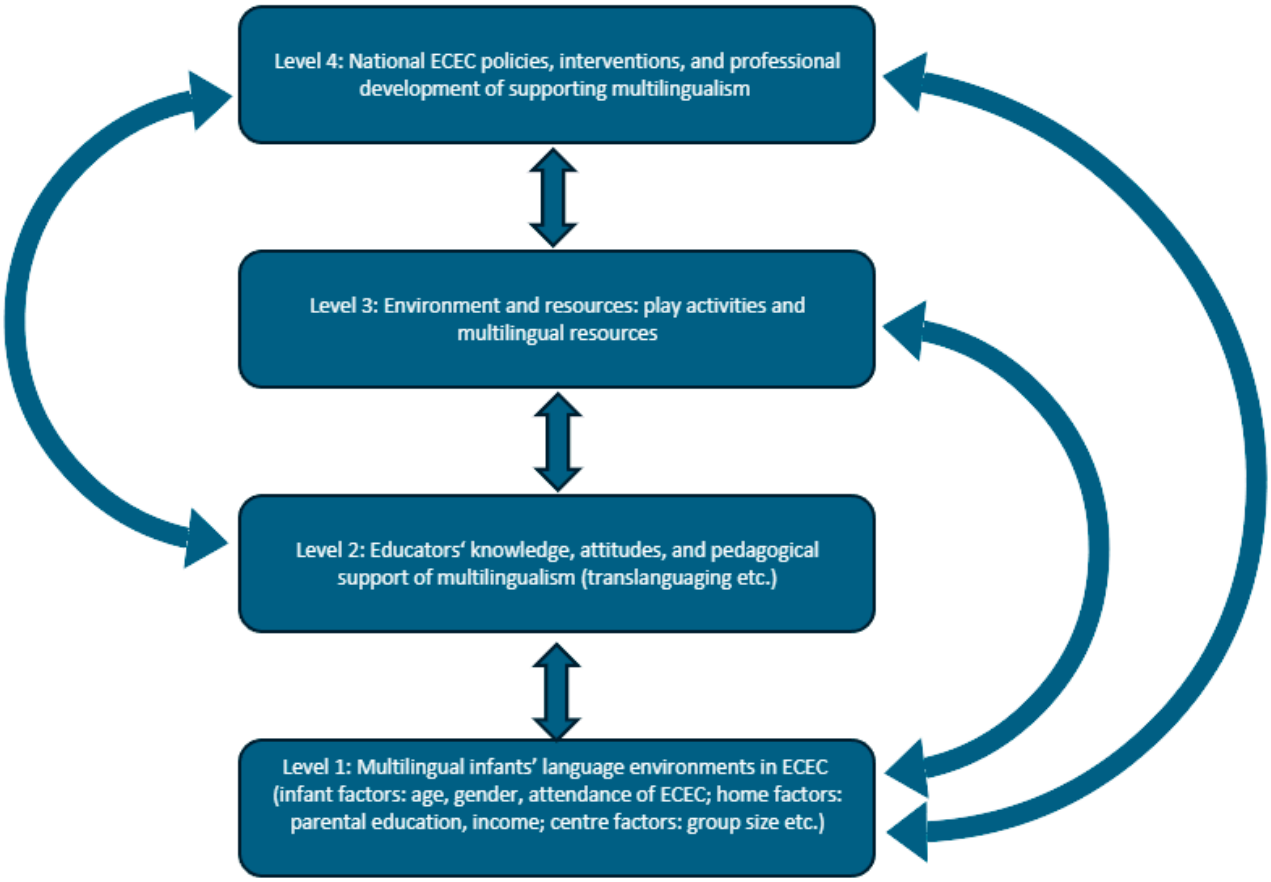

Figure 1. Ecobehavioural model of multilingual development in ECEC settings. Description: This model aims to capture the dynamics of supporting multilingual infants' language learning in ECEC contexts. In this model, Level 1 presents the infant, home and centre contextual factors that directly impact the quality and quantity of multilingual infants' ECEC language environments. Level 2 refers to early childhood educators' knowledge, attitudes and pedagogical practices. Level 3 indicates the role of various play activities and multilingual resources in supporting multilingualism. Level 4 refers to national ECEC policies, interventions and professional development of supporting multilingualism. While Level 4 does not directly impact Level 1, it serves as a distal influence on Level 1 through Levels 2 and 3. The arrows indicate bidirectional and dynamic relationships between levels.

Similar to their monolingual peers, multilingual infants' learning of each language is strongly shaped by the social and cultural environments around them (Degotardi, 2021). There is great variance in infants' exposure to each language received from educators in early childhood centres (Degotardi et al., 2018; Zheng et al., 2025). Accordingly, some multilingual infants grow up to develop high proficiency in both languages, while others have lower proficiency in their home language (Degotardi, 2021).

Multilingual infants require exposure to language-rich environments to achieve proficiency in each language. If multilingual infants do not receive enough high-quality multi/bilingual input, it is difficult for them to become proficient in all their languages (Degotardi, 2021; De Houwer, 2021; Zheng et al., 2021). This new ecobehavioural model of supporting multilingual development in ECEC provides direct implications for policy makers, educators and parents who can draw on the model to collaboratively provide supportive multi-language-rich environments. The following sections introduce each level of the model.

4.1. Level 1: Centre, Home and Infant Factors That Impact Multilingual Infants' Language Environments in ECEC

Level 1 represents the "key engine" of the model—that is, the quantity and quality of the interactions between multilingual infants and educators in ECEC environments. It should be noted that more studies have examined potential factors associated with monolingual infants' language environments (Degotardi et al., 2018); very few studies have examined the language environment of ECEC settings with a focus on multilingual infants. Therefore, in this section, we also include studies on multilingual toddlers and preschoolers, as they might provide insightful perspectives to help us understand multilingual infants' language learning experiences in ECEC. In addition, comparing these studies would contribute to our understanding of how the results are shaped by the child's age (multilingual infants vs. preschoolers).

Before discussing how various factors impact multilingual infants' language learning in ECEC, it is important to understand how we measure their language environments. In studies on ECEC language environments, a range of measures have been used to capture the quantity of educators' language input, including the number of words, word types and utterances. These quantitative data of language input are often measured through a range of structured assessments, educator questionnaires and transcripts of recordings from observational data (K. C. J. Chan et al., 2023; Dickinson & Porche, 2011). While these measures demonstrate important contributions to capturing the quantity of language input, they are mainly suitable for a rather small sample size and relatively short hours of recordings (Wang et al., 2020). In the last two decades, researchers have started to use LENA (Language ENvironment Analysis) technology (https://www.lena.org/) to capture monolingual and multilingual children's language experiences in ECEC settings. Previous studies on ECEC environments have compared LENA measures with human coders, reporting reliability between 72% and 91% (Degotardi et al., 2018; Soderstrom & Wittebolle, 2013). Therefore, LENA measures have been useful quantitative tools for understanding day-long quantities of educators' language input and interactions between educators and multilingual children in ECEC. Previous studies based on LENA measures consistently found that multilingual preschoolers received less adult talk and engaged in fewer conversational turns per hour than the monolingual group in ECEC environments in the United States (Wood et al., 2016; Choi et al., 2023). These studies indicate that multilingual children may be disadvantaged in their ECEC language environments when compared with their monolingual peers.

It should be noted that the LENA software only provides quantitative data about the language environment. To capture a comprehensive picture of multilingual infants'

language learning in ECEC, it is important to review prior studies that have used a combination of different tools (e.g., video observations, LENA audio-recordings). For example, through video observations, Italian early childhood educators were found to use more co-speech gestures and less verbal communication to interact with multilingual toddlers compared to monolingual toddlers in order to adjust multilingual toddlers' majority language (Italian) levels (Florit et al., 2024). Also, K. C. J. Chan et al. (2023) examined the quantity and quality of language samples from 13 English monolingual and 10 multilingual preschoolers during their daily routines and activities in England. Although there was no significant difference in the quantity of educators' language input between multilingual and English monolingual children, educators employed less diverse vocabulary, shorter and simpler utterances, and less complex syntactic structure in conversations with multilingual children to adapt to their low English proficiency (K. C. J. Chan et al., 2023). However, given that these references are from older age groups, caution should be exercised when generalising the outcomes to multilingual infants.

The above studies indicate that there is great variation in the quantity and quality of language input in ECEC environments and interactions with educators between multilingual and monolingual children (Zheng et al., 2025). It is therefore important to investigate how infant, centre, and home environmental characteristics impact multilingual infants' language environments in ECEC.

The first to consider is infant characteristics. As multilingual children are active conversational partners during interactions, child factors (e.g., age, gender, multilingual language background) and length of attendance in ECEC may affect how infants interact and respond to educators in ECEC language environments. Starting ECEC before age two was positively related to multilingual children's language skills in Norwegian and had no negative impact on their home language abilities (Rydland & Grøver, 2021). In addition, there are great variations in multilingual infants' personality, communication style and language competence, which also contribute to the quality and quantity of interactions with educators and influence how educators respond to multilingual infants in ECEC (De Houwer, 2021). Research also suggests that when relatively new to the centre, multilingual infants vocalise significantly less than monolingual infants. However, the gap between monolingual and multilingual infants' vocalisations is not evident in infants who have longer ECEC experience (Zheng et al., 2023). Such research highlights the significance of ECEC attendance in supporting multilingual infants' language development and closing the gap of language inequities among children at this level.

Infant characteristics and ECEC environments may directly influence infant language learning experiences, but home environment variables, such as income and parent education, may also indirectly influence the quality and quantity of interactions between multilingual infants and educators through infants' various communication patterns and behaviours from home to the centre. For older children, Wood et al. (2016) reported that multilingual preschoolers from low-SES backgrounds received less language input and engaged in fewer adult–child conversational turns than their monolingual peers across home and ECEC environments. Family income has been found to negatively impact the conversational turns preschoolers engage in with educators in ECEC classrooms, regardless of their language background (Duncan et al., 2023). However, Zheng et al. (2023) found that neither income nor maternal education impacted multilingual infants' language environments. Additionally, no significant differences in educators' language input or conversational turns received between monolingual and multilingual infants were found (Zheng et al., 2023). In addition, children's experiences in home and ECEC settings can interact with one another and jointly impact children's development. For multilingual infants, communication between educators and families may be particularly challenging

when they do not speak the same language. At such a young age, infants rely on support from their adult caregivers to navigate the cultural and linguistic gaps across the home and ECEC contexts (De Houwer, 2021).

In summary, this level of the model draws attention to the factors that influence the quantity and quality of educators' input to multilingual infants, interactions with multilingual infants and multilingual infants' responses. In the next level, we focus on the importance of educators' knowledge, attitudes and practices on multilingual development and the role of this level in the whole model.

4.2. Level 2: Early Childhood Educators' Knowledge, Attitudes and Pedagogical Support on Multilingual Development

Level 2 of the model focuses on the impact of educators' knowledge, attitudes and pedagogical support on multilingual infants' language learning environments. Research has suggested that many parents and early childhood educators hold myths and misconceptions on bilingualism, such as: (a) learning two languages will cause confusion for children; (b) speaking the home language will be harmful for children's majority language learning (e.g., English); and (c) multilingual children are more likely to have speech delay, disability and other developmental challenges (Byers-Heinlein & Lew-Williams, 2013; Sawyer et al., 2017; Zheng, 2025). Similarly, some educators may prioritise majority language skills and hold negative attitudes toward home language maintenance, as they value the social and academic advantages of their children learning the majority language (Sawyer et al., 2017). Furthermore, educators' personal language backgrounds, immigration experiences, and multilingual skills may also influence how they interact with infants with diverse linguistic needs. For example, research found that preschool teachers' beliefs about multilingualism were related to whether the teachers spoke other languages at home or were born overseas (Garrity et al., 2015). And teachers from white ethnic backgrounds held less favourable attitudes towards multilingual education in the United States (Garrity et al., 2015).

In ECEC environments, educators' knowledge and positive attitudes towards multilingual learning can help them to provide better support for multilingual development (Garrity et al., 2015; Zheng et al., 2024). Educators' language-supporting strategies, pedagogies and practices create better learning opportunities during interactions with multilingual infants (Zheng et al., 2024). In return, educators' practices facilitate multilingual infants' development of communication skills and knowledge construction during interactions and conversations in ECEC. If educators do not have sufficient knowledge to understand the role of home language in multilingual infants' learning in ECEC rooms, they would have less confidence and be less likely to employ supporting pedagogies to support multilingual development (Degotardi & Gill, 2019).

This level of the model also emphasises educators' pedagogical support for multilingual development. One of the most important pedagogies in multilingual education is translanguaging (García, 2009; García et al., 2017; Li, 2014, 2018). Translanguaging pedagogy refers to educators' integration of multilingual children's full linguistic repertoires, as well as children's languages and other multimodal resources (e.g., gestures, body language or other visual cues), for supporting children's meaning making and knowledge construction in classroom practices (García, 2009; Li, 2014; Tai, 2024). Studies on translanguaging practices in preschool settings illustrate that such practices promote communication between multilingual children and educators, boost children's engagement and participation during daily activities, and support children's wellbeing (Sembiante et al., 2023). While these studies focus on preschool children, it is also important to consider whether the developmental discontinuities between infants and preschoolers (e.g., non-verbal communication dominance, pre-linguistic stages) meaningfully challenge the generalisability of findings across age groups. For younger children, translanguaging also enables educators

to support multilingual infants to express their understanding of their bilingual identities, drawing on infants' fund of linguistic and cultural knowledge (Zheng et al., 2024).

Educators' capacity to draw on children's knowledge, experiences, and languages in play-based learning, as well as to use translation, is important for supporting multilingual infants and toddlers in ECEC settings (Kultti, 2022). A scoping review found that translanguaging was a key strategy educators use to promote the learning of both the majority and home languages for children under the age of five (Zheng et al., 2021). More recent studies have also revealed translanguaging as an important pedagogic practice that educators employ in communication with multilingual infants, too. These translanguaging practices are particularly important for infants, who primarily communicate through non-verbal behaviours (Zheng et al., 2024). For example, for multilingual infants, creating a translanguaging space requires educators to acknowledge the importance of incorporating infants' home languages and multimodal resources (e.g., body language, gestures) in their interactions with multilingual infants (Garrity et al., 2015). Educators employ translanguaging practices to help multilingual infants foster their multilingual repertoires, understand the new objects around their environment through knowledge construction, and develop their multilingual identities during play-based interactions (Zheng et al., 2024). Translanguaging supports multilingual infants in learning the connections between both languages through translation. Translanguaging practices are particularly crucial during the transition time, which provides emotional support and behaviour regulation for multilingual infants (Zheng et al., 2024). Such practices contribute to creating a translanguaging space, where speakers (both educators and children) can use both languages and other multimodal resources to express their thoughts and exchange ideas flexibly (Li, 2011).

Alongside translanguaging, educators have also been found to employ other language-supporting strategies to scaffold multilingual infants' learning (Degotardi, 2021). Evidence indicates the value of employing infant-oriented (follow the infant's lead/interest), interaction-promoting (respond to the infant's gesture/words, questioning), and language-modelling (repetition, labelling) strategies with very young children. These strategies are evident during interactions between multilingual infants and educators as well. For example, Zheng et al. (2024) described how an educator noticed a multilingual infant's interest in a bird and then followed the infant's lead to initiate a discussion about a bird in the sky flexibly in English and Mandarin. Such infant-specific strategies are different from strategies for interacting with older multilingual children, such as preschoolers in the prior literature (Zheng et al., 2024), which focus more on topic extension, sophisticated vocabulary and inferencing (Dickinson & Porche, 2011; Justice et al., 2013). Also, it should be acknowledged that some of the educators' language-supporting practices may promote learning of different languages simultaneously, whereas others may primarily promote one language and indirectly influence the other through language transfer (Zheng et al., 2021).

4.3. Level 3: Contexts Matter: Daily Routines, Activities and Resources

In this ECEC ecobehavioural model, activities and learning materials provide contexts for educators to create language learning opportunities to engage multilingual children in conversations. Like their monolingual peers, multilingual infants also learn language and interact with educators through play-based activities in ECEC contexts (Degotardi, 2021). It is therefore important that multilingual children are exposed to languages and engage in bilingual interactions in various play-based learning contexts in ECEC (Pontier et al., 2020). In their review, Pontier et al. (2020) identified a range of contexts for supporting multilingual children's home language maintenance: sociodramatic play, unstructured free play, show-and-tell and read-aloud literacy activities in preschool settings.

For younger children, educators have been shown to use singing combined with conversations to help multilingual toddlers learn lyrics and vocabulary, as well as further develop their majority language (Swedish) skills for communication needs (Kultti, 2013). In another study, educators spoke more of children's home languages in teacher-led story time and child-led free play than in other routines such as mealtimes in Australian toddler rooms (Escudero et al., 2020). Therefore, a range of play-based activity contexts and multilingual resources can provide rich learning materials to facilitate educators' interactions and conversations with all multilingual children, including multilingual infants under the age of two. For example, during free play, educators discussed the objects that multilingual infants were interested in at the moment, such as the bird in the sky or the family photos on the wall (Zheng et al., 2024). Also, shared book reading and block play provided opportunities for educators to initiate translanguaging conversations with multilingual infants (Zheng et al., 2024). The positive impacts of shared book reading have also been identified in studies on monolingual infant–educator interactions, as the contents of high-quality picture books enable infants to be exposed to a rich and diverse vocabulary (Degotardi, 2021; Torr, 2019). While more studies are needed to understand the benefits of multilingual book reading for multilingual infants under the age of two, research has also found that multilingual story books have positive impacts on multilingual preschoolers' vocabulary and grammar skills, and their understanding of others' emotions and perspectives, which were linked to their social-emotional development (Grøver et al., 2020). A multilingual book-reading intervention predicted Norwegian multilingual preschoolers' vocabulary growth in both their home languages and Norwegian. In the intervention, preschool teachers were instructed with strategies on teaching target words; encouraging children's reasoning skills; supporting word comprehension about emotions, internal states and perspectives; and extending knowledge from the targeted vocabulary based on selected books (Grøver et al., 2020). The multilingual book-reading intervention predicted Norwegian multilingual preschoolers' vocabulary growth in both their home languages and Norwegian. Further research examining the effects of various activity contexts in supporting multilingual infants' language learning in ECEC is needed.

4.4. Level 4: Policies That Support Multilingual Development in ECEC

Level 4 of the model draws attention to the role of policy makers and other stakeholders in creating conditions for high-quality interactions with multilingual infants in ECEC. National or jurisdictional ECEC policy frameworks constitute an important policy backdrop that shapes how language-supporting practices will transpire in local ECEC contexts. For example, in Australian contexts, the National Quality Standard (NQS) provides a national framework for assessing the quality of ECEC services in supporting children's learning outcomes (Australian Children's Education and Care Quality Authority (ACECQA) (2026)). Element 1.1.2 on child-centred programmes emphasises the inclusion of every child's current knowledge, ideas, culture, abilities and interests in ECEC programmes (Australian Children's Education and Care Quality Authority (ACECQA) (2026)). The Early Years Learning Framework (EYLF) for Australia (Australian Government Department of Education (AGDE) (2022)) also addresses the importance of using children's home languages to construct meaning and develop strong connections with the cultures and languages of their families. In Outcome 1.1, educators are encouraged to learn key words from a child's home language and use them during interactions and conversations (Australian Government Department of Education (AGDE) (2022)). In New Zealand, the early childhood curriculum states that "Learner identity is enhanced when children's home languages and cultures are valued" (Ministry of Education, 2017, p. 21). Also, the curriculum reinforces the importance of using home language in ECEC settings, as "Children more readily become bi- or

multilingual and bi- or multiliterate" (Ministry of Education, 2017, p. 12). These examples are aligned with the current model's recommendations, which link multilingualism with everyday programming and learning goals to guide educators' practices (Xu et al., 2025).

In addition, these curricula indicate how educators should provide culturally responsive support that is tailored for local contexts of multilingualism. For example, in the Australian Early Years Learning Framework (EYLF), educators are asked to "respond to children's expertise, cultural traditions and ways of knowing, and the multiple languages spoken by some children, including by Aboriginal and Torres Strait Islander children." (Australian Government Department of Education (AGDE) (2022), p. 21). Canada's early learning framework requires ECEC providers to "'recognize the unique needs of French and English linguistic minority communities" (Canada, 2017). In Hong Kong, supporting non-Chinese speaking children in learning Cantonese and Mandarin is on the local government's new agenda (Xu et al., 2025). In the Early Years Foundation Stage Statutory Framework, providers are asked to "take reasonable steps to provide opportunities for children to develop and use their home language in play and learning, supporting their language development at home" in the UK (Department for Education, England, 2025). Together, these examples address the importance of catering to the diverse needs of multilingual infants' language learning and development across national contexts, as well as ensuring the quality of educators' language input and interactions with multilingual infants in ECEC across different cultural contexts (Xu et al., 2025). This connects with the focus on language input and interactions with multilingual infants in Level 1 of our model.

However, A. Chan and Jones Díaz (2025)'s recent analysis of both Aotearoa New Zealand's and Australia's early childhood curriculum found that both policy documents failed to acknowledge the diverse cultural and language backgrounds through constantly using the singular form to describe "language" and "culture". The authors further argued that both curricula reflect a monolingual mindset by misrecognising the plurality and intersectionality of language and identity (A. Chan & Jones Díaz, 2025). A. Chan and Jones Díaz (2025) suggested that future versions of the curricula should introduce interactional pedagogies to acknowledge multilingual children's diverse linguistic repertoires. Lecusay et al. (2026) also found that Swedish early childhood policy documents linked children's learning outcomes, knowledge, and values with the focus of the acquisition of the national language, Swedish. Therefore, the current framework also underscores the need for relevant stakeholders to identify any specific policy changes to better support multilingualism and inclusion in ECEC.

Policy makers also need to develop initiatives aimed at raising awareness of the benefits of multilingualism and ways to promote multilingual learning in early childhood, as in Level 2 of the model. In turn, educators and parents can adapt their communication styles and employ language-supporting strategies to increase the quantity and quality of interactions with multilingual infants. Therefore, it is important to promote positive attitudes on multilingualism and to facilitate knowledge of multilingual development in the early years to parents, educators and communities (Fibla et al., 2022). Such actions can boost "long-term, positive consequences of the intergenerational transmission, especially of home languages—not only for the child but also for the family and culture as a whole" (Fibla et al., 2022, p. 38). For example, interventions on changing language attitudes and increasing multilingual knowledge from governments can support the growth of positive attitudes toward children from multilingual backgrounds and empower educators' pedagogical practices with multilingual infants (Fibla et al., 2022).

Moreover, Level 3 of the model shows that access to multilingual resources in ECEC centres, such as books and other multimodal resources, provides learning opportunities for promoting bilingual interactions during various everyday activities (Fibla et al., 2022).

The provision of appropriate funding by policymakers for such resources, or developing free online training, can help resolve educators' stress and challenges regarding a lack of learning materials, such as multilingual books and professional training on tailored multilingual strategies (Bernstein et al., 2021). This can motivate educators' intention to support multilingualism in ECEC settings.

Furthermore, ECEC policy documents often regulate structural quality features such as educator: child ratio, group size and educators' qualification levels. Studies have found, for example, that educator:child ratio and group size impact both monolingual and multilingual infants' language learning environments (Degotardi et al., 2018; Soderstrom et al., 2018; Zheng et al., 2023). For example, infants in large groups have been found to vocalise less than those in smaller groups (Zheng et al., 2023). Degotardi et al. (2018) also reported a negative relationship between group size and educators' language input in Australian infant rooms. This could be, when working with large groups of infants, educators often face challenges in maintaining meaningful, high-quality interactions. In this case, they may adopt a more managerial and less responsive approach, which limits opportunities for infants to vocalise and engage (Degotardi et al., 2018). The evidence from research reminds policymakers that even when ratios are optimal, the presence of too many children and educators in one space may reduce opportunities for language interactions, particularly in infant rooms (Degotardi et al., 2018). This underscores the importance of ensuring that the structural characteristics of infant ECEC settings maximise the conditions for a language-rich environment.

Notably, at this level, policymakers should reconsider other structural factors, such as the requirements of educators' qualification level, to support multilingual infants. While degree-qualified teachers are not required in Australian infant rooms, research on monolingual infant educators found that infant educators who held a bachelor's degree in early childhood education were more likely to have deeper knowledge of language development and use infant-centre language-supporting approaches than educators with a certificate 3 and a diploma (Han & Degotardi, 2021). In addition, given the large number of monolingual educators in Australian ECE workplaces and the varying beliefs monolingual educators hold about supporting multilingualism (Gide et al., 2022), policymakers should provide more opportunities to help educators work towards an early childhood degree to ultimately benefit all children.

5. Implications and Recommendations

The proposed ecobehavioural multi-level model for supporting multilingual development in ECEC settings provides a theoretical lens to examine how different stakeholders can contribute to high-quality and quantity of language input and interactions with multilingual infants. Our proposed framework can inform policymakers on how to provide better national guidelines and professional development for educators of multilingual infants. This model suggests that educators, researchers, and policymakers should focus on how the infant characteristics, home environmental characteristics and centre characteristics impact the quality and quantity of multilingual infants' language environments in ECEC for Level 1 (Egmose et al., 2026). More research is needed to help us understand how we can provide a high-quality language environment for multilingual infants.

In Level 2, we identified the importance of early childhood educators' knowledge, attitudes, and practices on multilingual development. Educators' knowledge and attitudes shape their practices to support multilingual infants. Positive beliefs about multilingualism, translanguaging pedagogies and other language-supporting strategies enable educators to scaffold multilingual infants' meaning-making of their everyday life, develop full linguistic repertoires (bilingual identities) and provide emotional support for their well-being (García,

2009; Li, 2026). Language-supporting strategies tailored for infants are also required to address multilingual infants' developmental needs. Future studies should examine the causality between educators' attitudes and practices, as well as the effectiveness of these practices on multilingual infants' language development.

Level 3 focuses on how the structural contexts and resources provide opportunities for maximum multilingual infants' learning. The prior literature identified the vital role of different play contexts in supporting multilingualism (Pontier et al., 2020). This model suggests that educators and researchers should consider how these contextual factors contribute to a high-quality language learning environment for multilingual infants.

Level 4 addresses the critical role of policies in supporting multilingual infants in ECEC and providing regulatory support for achieving the previous three levels. For example, in Australia, research has found that multilingual children are significantly less likely to attend ECEC services than monolingual children in their early years (Lampe et al., 2023; Collier et al., 2019). This level underscores the importance of ECEC attendance for supporting children's learning and development regardless of their language backgrounds. Ensuring multilingual infants' access to high-quality and quantity of language input and interactions from educators promotes educational equity and classroom inclusion in ECEC settings (OECD, 2025). Given the enormous evidence on the associations between educators' language-supporting practices and their qualification levels, introducing the regulation that infant rooms must include early childhood education degree teachers (ECT) or support educators work towards their ECT would benefit infants' learning regardless of their language backgrounds (Han & Degotardi, 2021). Regulations to ensure high-quality daily programmes and a low group size in infant rooms would also contribute to high-quality interactions between multilingual infants and educators (Zheng et al., 2023). Our model calls for ECEC policy makers and regulating authorities to consider revising guidelines regarding the structures and settings of services to ensure high-quality and quantity of educator–infant interactions in ECEC.

There are a number of limitations for this conceptual paper. As most studies cited in this article have been drawn on Western contexts, more research on Global South regions is needed to examine the generalisability of this model on other linguistic and cultural contexts. In addition, while this conceptual model focuses on multilingual infants in ECEC contexts, its applicability to older multilingual children in ECEC settings or outside ECEC settings needs to be carefully evaluated.

6. Conclusions

This theoretical paper proposes a new ecobehavioural model for supporting multilingual infants in ECEC. This model provides a feasible way to reflect how early childhood services provide a high-quality language environment to support multilingual infants' learning, development, and well-being. This conceptual article can guide early childhood educators to develop their professional knowledge on supporting multilingual infants throughout the integration of the ecological model, multilingualism and infant pedagogy. This article further highlights current research gaps and encourages more research under each level of this model. Our model informs future policy revisions to benefit all infants in order to create an inclusive and high-quality learning environment in ECEC.

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References

Adesope, O. O., Lavin, T., Thompson, T., & Ungerleider, C. (2010). A systematic review and meta-analysis of the cognitive correlates of bilingualism. *Review of Educational Research*, *80*(2), 207–245. [CrossRef]

Australian Children's Education and Care Quality Authority (ACECQA). (2026). *Guide to the national quality framework*. Available online: https://www.acecqa.gov.au/sites/default/files/2026-03/Guide-to-the-NQF-260326.pdf (accessed on 20 April 2026).

Australian Government Department of Education (AGDE). (2022). *Belonging, being and becoming: The early years learning framework for Australia (V2.0)*. Australian Government Department of Education for the Ministerial Council.

Bernstein, K. A., Kilinc, S., Troxel Deeg, M., Marley, S. C., Farrand, K. M., & Kelley, M. F. (2021). Language ideologies of Arizona preschool teachers implementing dual language teaching for the first time: Pro-multilingual beliefs, practical concerns. *International Journal of Bilingual Education and Bilingualism*, *24*(4), 457–480. [CrossRef]

Bialystok, E. (2011). Reshaping the mind: The benefits of bilingualism. *Canadian Journal of Experimental Psychology/Revue Canadienne de Psychologie Expérimentale*, *65*(4), 229–235. [CrossRef] [PubMed]

Bronfenbrenner, U. (Ed.). (2005). *Making human beings human: Bioecological perspectives on human development*. Sage Publications Ltd.

Byers-Heinlein, K., & Lew-Williams, C. (2013). Bilingualism in the early years: What the science says. *Learning Landscape*, *7*(1), 95–112. [CrossRef]

Canada. (2017). *Multilateral early learning and child care framework*. Available online: https://www.canada.ca/en/employment-social-development/programs/early-learning-child-care/reports/2017-multilateral-framework.html (accessed on 20 April 2026).

Chan, A., & Jones Díaz, C. (2025). Languages and identities: Locating intersectional pedagogies in Aotearoa New Zealand's and Australia's early childhood curriculum. *Early Years*, 1–15. [CrossRef]

Chan, K. C. J., Monaghan, P., & Michel, M. (2023). Adapting to children's individual language proficiency: An observational study of preschool teacher talk addressing monolinguals and children learning English as an additional language. *Journal of Child Language*, *50*(2), 365–390. [CrossRef] [PubMed]

Choi, J. Y., Van Pay, C. K., & Beecher, C. C. (2023). Preschool language exposure and use: A comparison study of dual-language learners and English monolingual children. *Infant and Child Development*, *32*(3), e2420. [CrossRef]

Collier, L., Gregory, T., Dal Grande, E., & Brinkman, S. (2019). *The Australian early childhood education development experience research project (AECEDE): Exploring the association between early childhood education and care pathways and child development outcomes at school entry*. Telethon Kids Institute.

Degotardi, S. (2021). The language environment of infant child care: Issues of quantity, quality, participation and context. In *Contemporary perspectives on research on child care in early childhood education* (pp. 85–107). Information Age Publishing, Inc.

Degotardi, S., & Gill, A. (2019). Infant educators' beliefs about infant language development in long day care settings. *Early Years*, *39*(1), 97–113. [CrossRef]

Degotardi, S., Han, F., & Torr, J. (2018). Infants' experience with 'near and clear' educator talk: Individual variation and its relationship to indicators of quality. *International Journal of Early Years Education*, *26*(3), 278–294. [CrossRef]

De Houwer, A. (2021). *Bilingual development in childhood*. Cambridge University Press. [CrossRef]

Department for Education, England. (2025). *Early years foundation stage statutory framework*. Available online: https://early-education.org.uk/early-years-foundation-stage-framework/ (accessed on 12 December 2025).

Dickinson, D. K., & Porche, M. V. (2011). Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities. *Child Development*, *82*(3), 870–886. [CrossRef]

Duncan, R. J., Anderson, K. L., King, Y. A., Finders, J. K., Schmitt, S. A., & Purpura, D. J. (2023). Predictors of preschool language environments and their relations to children's vocabulary. *Infant and Child Development*, *32*(1), e2381. [CrossRef]

Egmose, I., Støve, L. L., Nielsen, A. F., Stuart, A. C., Helmerhorst, K. O. W., Wendelboe, K. I., Væver, M. S., & Smith-Nielsen, J. (2026). Caregivers' interaction skills in center-based childcare: Associations with ratios, education, and interaction contexts. *Early Childhood Research Quarterly*, *76*, 29–39. [CrossRef]

Escudero, P., Jones Diaz, C., Hajek, J., Wigglesworth, G., & Smit, E. A. (2020). Probability of heritage language use at a supportive early childhood setting in Australia. *Frontiers in Education*, *5*, 93. [CrossRef]

Fibla, L., Kosie, J. E., Kircher, R., Lew-Williams, C., & Byers-Heinlein, K. (2022). Bilingual language development in infancy: What can we do to support bilingual families? *Policy Insights from the Behavioral and Brain Sciences*, *9*(1), 35–43. [CrossRef] [PubMed]

Florit, E., Barachetti, C., Majorano, M., & Lavelli, M. (2024). Linguistic interactions at nursery school and language acquisition of toddlers from low-income bilingual immigrant families and monolingual families. *International Journal of Bilingual Education and Bilingualism*, *27*(4), 455–471. [CrossRef]

Ford, A. L. B., Elmquist, M., Merbler, A. M., Kriese, A., Will, K. K., & McConnell, S. R. (2020). Toward an ecobehavioral model of early language development. *Early Childhood Research Quarterly*, *50*, 246–258. [CrossRef]

García, O. (2009). *Bilingual education in the 21st century: A global perspective*. Blackwell.

García, O., Johnson, S. I., & Seltzer, K. (2017). *The translanguaging classroom: Leveraging student bilingualism for learning*. Carlson.

García, O., & Wei, L. (2021). *Translanguaging for social justice: Global and local perspectives*. Multilingual Matters.

Garrity, S., Aquino-Sterling, C. R., & Day, A. (2015). Translanguaging in an infant classroom: Using multiple languages to make meaning. *International Multilingual Research Journal*, *9*(3), 177–196. [CrossRef]

Gide, S., Wong, S., Press, F., & Davis, B. (2022). Cultural diversity in the Australian early childhood education workforce: What do we know, what don't we know and why is it important? *Australasian Journal of Early Childhood*, *47*(1), 48–61. [CrossRef]

Ginsburgh, V., & Prieto-Rodriguez, J. (2011). Returns to foreign languages of native workers in the EU. *Industrial and Labor Relations Review*, *64*(3), 599–618. [CrossRef]

Grøver, V., Rydland, V., Gustafsson, J. E., & Snow, C. E. (2020). Shared book reading in preschool supports bilingual children's second-language learning: A cluster-randomized trial. *Child Development*, *91*(6), 2192–2210. [CrossRef]

Han, F., & Degotardi, S. (2021). Infant educators' reported conceptions of, and approaches to, infant language development: How do they relate to educator qualification level? *Early Childhood Education Journal*, *49*(2), 259–271. [CrossRef]

Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review*, *26*(1), 55–88. [CrossRef]

Jaakkola, E. (2020). Designing conceptual articles: Four approaches. *AMS Review*, *10*, 18–26. [CrossRef]

Jabareen, Y. (2009). Building a conceptual framework: Philosophy, definitions, and procedure. *International Journal of Qualitative Methods*, *8*(4), 49–62. [CrossRef]

Justice, L. M., McGinty, A. S., Zucker, T., Cabell, S. Q., & Piasta, S. B. (2013). Bi-directional dynamics underlie the complexity of talk in teacher–child play-based conversations in classrooms serving at-risk pupils. *Early Childhood Research Quarterly*, *28*(3), 496–508. [CrossRef]

Kultti, A. (2013). Singing as language learning activity in multilingual toddler groups in preschool. *Early Child Development and Care*, *183*(12), 1955–1969. [CrossRef]

Kultti, A. (2022). Globalising early childhood education (GECE). *International Journal of Multilingualism*, *21*(1), 548–558. [CrossRef]

Lampe, B., Healey, B., Collier, L., & Jackson, J. (2023). *Promoting equity for multilingual children in early childhood*. Australian Education Research Organisation. Available online: https://www.edresearch.edu.au/sites/default/files/2023-11/promoting-equity-multilingual-children-ecec-aa.pdf (accessed on 12 January 2024).

Lecusay, R., Olsson, L. M., & Nilsson, M. (2026). Inequality and inclusion in Swedish early childhood education and care: A policy analysis. *International Journal of Early Childhood*, *20*, 15. [CrossRef]

Li, W. (2011). Moment analysis and translanguaging space: Discursive construction of identities by multilingual Chinese youth in Britain. *Journal of Pragmatics*, *43*(5), 1222–1235. [CrossRef]

Li, W. (2014). Translanguaging knowledge and identity in complementary classrooms for multilingual minority ethnic children. *Classroom Discourse*, *5*(2), 158–175. [CrossRef]

Li, W. (2018). Translanguaging as a practical theory of language. *Applied Linguistics*, *39*(1), 9–30. [CrossRef]

Li, W. (2026). Home, heritage and community language learning: A distinct path of cultural sustainability. *The Language Learning Journal*, *54*(1), 153–159. [CrossRef]

Luk, G., De Sa, E., & Bialystok, E. (2011). Is there a relation between onset age of bilingualism and enhancement of cognitive control? *Bilingualism: Language and Cognition*, *14*(4), 588–595. [CrossRef]

Ministry of Education. (2017). *Te Whāriki. He Whāriki Mātauranga Mō Ngā Mokopuna O Aotearoa. Early childhood curriculum*. Te Whāriki Early Childhood Curriculum.

OECD. (2025). *Results from TALIS starting strong 2024: Strengthening early childhood education and care*. TALIS, OECD Publishing. [CrossRef]

Pontier, R., Destro Boruchowski, I., & Olivo, L. (2020). Dynamic language use in bi/multilingual early childhood education contexts. *Journal of Culture and Values in Education*, *3*(2), 158–178. [CrossRef]

Rydland, V., & Grøver, V. (2021). Language use, home literacy environment, and demography: Predicting vocabulary skills among diverse young dual language learners in Norway. *Journal of Child Language*, *48*(4), 717–736. [CrossRef]

Sawyer, B. E., Manz, P. H., & Martin, K. A. (2017). Supporting preschool dual language learners: Parents' and teachers' beliefs about language development and collaboration. *Early Child Development and Care*, *187*(3–4), 707–726. [CrossRef]

Schweizer, T. A., Ware, J., Fischer, C. E., Craik, F. I., & Bialystok, E. (2012). Bilingualism as a contributor to cognitive reserve: Evidence from brain atrophy in Alzheimer's disease. *Cortex*, *48*(8), 991–996. [CrossRef] [PubMed]

Sembiante, S. F., Restrepo-Widney, C., Bengochea, A., & Gort, M. (2023). Sustainable translanguaging pedagogy in support of the vulnerable language: Honoring children's ways of 'Showing' and 'Telling' in an early childhood dual language bilingual education program. *International Journal of Bilingual Education and Bilingualism*, *26*(8), 928–942. [CrossRef]

Soderstrom, M., Grauer, E., Dufault, B., & McDivitt, K. (2018). Influences of number of adults and adult: Child ratios on the quantity of adult language input across childcare settings. *First Language*, *38*(6), 563–581. [CrossRef]

Soderstrom, M., & Wittebolle, K. (2013). When do caregivers talk? The influences of activity and time of day on caregiver speech and child vocalizations in two childcare environments. *PLoS ONE*, *8*(11), e80646. [CrossRef]

Suskind, D., Leffel, K. R., Hernandez, M. W., Sapolich, S. G., Suskind, E., Kirkham, E., & Meehan, P. (2013). An exploratory study of "Quantitative Linguistic Feedback": Effect of LENA feedback on adult language production. *Communication Disorders Quarterly*, *34*(4), 199–209. [CrossRef]

Tai, K. W. H. (2024). Shaping student responses into academic expressions: Analysing an English medium instruction history classroom from a translanguaging perspective. *International Journal of Bilingual Education and Bilingualism*, *27*(4), 550–580. [CrossRef]

Torr, J. (2019). Infants' experiences of shared reading with their educators in early childhood education and care centres: An observational study. *Early Childhood Education Journal*, *47*(5), 519–529. [CrossRef]

Verdon, S., McLeod, S., & Winsler, A. (2014). Language maintenance and loss in a population study of young Australian children. *Early Childhood Research Quarterly*, *29*(2), 168–181. [CrossRef]

Vygotsky, L. S. (1978). *Mind in society: Development of higher psychological processes*. Harvard University Press. [CrossRef]

Wang, Y., Williams, R., Dilley, L., & Houston, D. M. (2020). A meta-analysis of the predictability of LENA™ auto-mated measures for child language development. *Developmental Review*, *57*, 100921. [CrossRef] [PubMed]

Wood, C., Diehm Emily, A., & Callender Maya, F. (2016). An investigation of language environment analysis measures for Spanish–English bilingual preschoolers from migrant low-socioeconomic-status backgrounds. *Language, Speech, and Hearing Services in Schools*, *47*(2), 123–134. [CrossRef]

Xu, Y., Brooks, C., Gao, J., & Kitto, E. (2025). The manifestations of universality and cultural specificity in national curriculum policy frameworks: Negotiations for culturally reflective practice in early childhood education. *Pedagogy, Culture & Society*, *33*(2), 655–674. [CrossRef]

Zauche, L. H., Thul, T. A., Mahoney, A. E. D., & Stapel-Wax, J. L. (2016). Influence of language nutrition on children's language and cognitive development: An integrated review. *Early Childhood Research Quarterly*, *36*, 318–333. [CrossRef]

Zheng, Z. (2025). Teachers' beliefs about multilingualism in early childhood education settings: A scoping review. *Education Sciences*, *15*(7), 849. [CrossRef]

Zheng, Z., Degotardi, S., & Djonov, E. (2021). Supporting multilingual development in early childhood education: A scoping review. *International Journal of Educational Research*, *110*, 101894. [CrossRef]

Zheng, Z., Degotardi, S., & Djonov, E. (2024). Translanguaging practices in infant rooms: Case studies of Chinese-Australian bilingual infant-educator interactions. *International Journal of Bilingual Education and Bilingualism*, *27*(8), 1021–1035. [CrossRef]

Zheng, Z., Degotardi, S., Sweller, N., & Djonov, E. (2023). Effects of multilingualism on Australian infants' language environments in early childhood education centers. *Infant Behavior and Development*, *70*, 101799. [CrossRef]

Zheng, Z., Degotardi, S., Sweller, N., & Djonov, E. (2025). What factors are associated with young children's language learning environment? A systematic review of language environment analysis (LENA) measures. *Early Education and Development*, *36*(6), 1247–1277. [CrossRef]

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