

**Quality Teacher-child interactions
in the early years.
What does 'good' look like?**

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This article is a literature review investigating quality interactions in early childhood education classrooms. The aim is to identify what quality interactions look like and why there seems to be a paucity of quality teacher-child interactions, considering there is ample evidence from the past two decades showing that this form of pedagogy improves children's outcomes. There is an increasing awareness and a growing body of evidence that emphasises the significance of high-quality teacher-child interactions within early childhood education (ECE) for better developmental outcomes for children (Siraj-Blatchford, et al., 2003; Mashburn, et al., 2008; Urban, et al., 2012; Center on the Developing Child at Harvard University, 2016; Pianta, Downer and Hamre, 2016; Hayes, 2019). To date, although there have been large scale research studies emphasising the importance of quality interactions (Siraj-Blatchford, et al., 2002; Sylva, et al., 2004; Howes, et al., 2008; Mashburn, et al., 2008; Pianta, Downer and Hamre, 2016; Siraj, et al., 2018) there remains an incredible privation of observed enactment of quality teacher-child interactions which stimulate higher order thinking within ECE settings internationally (Egert, Dederer and Fukkink, 2020).

The perception of 'quality' is subjective and dependent on the perspective of a parent, policymaker or educator (Moss, 2016), upon which value judgments are made, which have implications in practice (Dahlberg, Moss and Pence, 1999). Within any definition of 'good' and 'quality', there are limitations, and more questions arise due to their subjective nature, nevertheless, the meaning of the words 'good' and 'quality' needs to be quantified in the context of this study. Thus, the term 'quality' in this study will use a definition first suggested by Juran (1962 cited in Reeves and Bednar, 1994, p.425) "A vague expression of general excellence but without being specific enough to be classified". In creating the 2030 Sustainable Development Goals (SDG) the United Nations made quality education a global priority. SDG target 4.2 states, "By 2030, ensure that all girls and boys have access to quality early childhood development, care and preprimary education so that they are ready for primary education" (United Nations, N.D. Goal 4.2).

Evidence From Neuroscience

There is growing scientific evidence that a child's positive and negative experiences leave a lasting impact on the developing brain (Champagne, 2010). The Center on the Developing Child at Harvard University (2016) has been using neuroscience to study the brain's architecture, and research shows that more than 1 million new synapses form every second during the first few years of life. Children's brains develop at the most rapid pace between birth and six years old; during this time, the brain structure is forming and growing (Tierney and Nelson, 2009) as the neurons form synapses and create pathways or circuits. "Experience dependent synaptogenesis enables life-long plasticity with respect to new learning" (Goswami, 2009, p. 382); thus, children's experiences shape their brains over time as they learn new information that gradually forms more abstract information and concepts. More recently, scientists have discovered that the process of reciprocal adult-child exchanges strengthens synaptic connections; thus, increased quality interactions can "capitalise on the early neural plasticity underlying cognitive development" (Romeo, et al., 2018, cited in Jarvis, 2018, p. 304). However, when the synapses are not used, they go through an aggressive natural process called neural pruning (Goswami, 2009; Center on the Developing Child at Harvard University, 2016). Thus, with under stimulation or adverse childhood experiences, the synapses can be over-pruned, which may leave children at a distinct disadvantage for later learning (Hawley and Gunner, 2000).

Brain imaging has shown that neglected children or children who have not been stimulated or provided with rich experiences have less dense, smaller brains (Perry 2002, cited in Wright, 2015); this suggests that under-stimulation can effectively cause the brain to shrink. The term 'serve and return' was coined to explain the importance of the back-and-forth interaction between adults, infants and young children (Center on the Developing Child at Harvard University, 2019).

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This human interaction is critical to brain development (Center on the Developing Child at Harvard University, 2019), and research has shown this social interaction, rather than pure audio or video, is crucial for language learning (Kuhl, 2010).

According to the evidence above, science has shown that children need responsive and attentive adults that interact with them in order for optimal brain growth and development. Therefore, growth and development are a dynamic process that depends not only on genetics and a nutrient-rich diet (Champagne, 2010) but are also contingent on a child's early experiences that require human interaction (Hawley and Gunner, 2000).

Theoretical Perspectives

More than a century ago, Dewey understood the importance of stimuli, which can be interpreted as quality interactions and enriched experiences that stimulate development. He stated, "What new experiences are desirable and thus what stimuli are needed, it is impossible to tell except as there is some comprehension of the development which is aimed at" (Dewey, 1902, p. 19).

Vygotsky considered the fundamental function of speech as social communication and that language is essential to learning and intellectual growth (Vygotsky, 1978; 1986); a view that is supported by Mercer (2013) who argues that language can be used to connect minds to problem solve. Vygotsky described development as dynamic where learning takes place in the zone of proximal development (1978). Thus, collaboration of teacher and child through interaction promotes social learning. Although a cognitive constructivist, Bruner expanded on the work of Vygotsky acknowledging that children learn through interactive relationships with their elders and when scaffolded, the child can achieve a lot more than would ordinarily be beyond the child's independent effort (Wood, Bruner and Ross, 1976). By modelling or giving verbal cues, the teacher can work cooperatively with the child to promote learning (Wood, 1986). Children construct their understanding through collaboration and discussion around their experience, making meaning within their culture and context (Bruner, 1996).

Rogoff (1990) constructed the concept of guided participation by developing ZPD and scaffolding theories further. Rogoff's concept of guided participation (1990) is where the teacher interacts with children and guides their participation in specific activities by assimilating and stretching their understanding of new concepts (Mercer, 2000). Although Rogoff focuses on interaction for learning, it differs from "Vygotsky's emphasis on didactic dialogue" (Scott and Palincsar, 2013, p. 3) and is somewhat grounded in diverse forms of interaction such as semiotics and tacit distal forms of communication. Rogoff's stance is linked to her research in cross-cultural

studies in indigenous communities where children learn by observing the elders in the community, thus providing children with ways to use language to assimilate and adapt for later use (Mercer, 2000). In a similar vein, the bioecological model of human development (Bronfenbrenner and Morris, 2007) describes the complex ways that a child's relationships and interaction with the environment affect development. In ECE, the teacher becomes part of the microsystem and the teacher-child interactions the proximal processes. Thus, through the lens of the biological systems theory, teacher-child interactions and the relationships that form are crucial to the child's positive developmental outcomes more than the context in which it occurs (Bronfenbrenner and Evans, 2000).

Siraj-Blatchford (2009) views sustained shared thinking (SST) as predominantly analogous to Vygotsky's (1978) ZPD; likewise, guided participation, dialogic teaching and scaffolding are comparable to SST (Siraj-Blatchford, 2009). Consequently, no matter their differences, all the theorists, as mentioned earlier, focus on the relationship between the child and the adult and the adult's role during the interaction.

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An International Conundrum

On an international level, one of the most frequently mentioned dimensions of quality provision, besides the structural quality, is the quality of the teacher-child interactions within the ECE, or at other times called process quality (OECD, 2020).

One of the most significant longitudinal studies from the United Kingdom, the Effective Provision of Preschool Education Project (EPPE) from 1997-2004, aimed to identify the characteristics that create effective ECE settings and improved outcomes for children's development (Sylva, et al., 2004). The findings included the importance of effective pedagogy, including sustained shared thinking (SST) to extend children's thinking. SST is closely linked with Vygotsky's (1978) zone of proximal development and scaffolding. It has been argued that SST is best described as a form of effective quality pedagogical interaction rather than an activity (Gripton and Knight, 2020). The findings showed that SST did not occur very frequently; what is more, 94.5% of the questions asked were closed rather than open questions (Siraj-Blatchford and Manni, 2008). Following on from the EPPE Project was Researching Effective Pedagogy in the Early Years (REPEY), which focused on 12 settings in which children had made good or excellent progress (Siraj-Blatchford, et al., 2002). The findings suggested that in these settings, the staff extended child-initiated interactions and extended the child's thinking and that there was a balance of child-initiated and adult-initiated interaction.

A systematic review of the literature on ECE interaction and the impact on learning and development suggested that highly responsive teachers, extended conversations and extending children's thinking were all components of quality interactions (Garcia-Carrión and Villardón-Gallego, 2016). Of concern, a recent study in Wales, identified that consistently weak areas of the provision were in "supporting learning and critical thinking" (Waters and MacDonald, 2020, p.5). Although there are limitations to this small-scale study, it supports the argument that teachers rarely use quality interactions to support children's learning and higher-order thinking skills.

A three-year action research study (Fisher and Wood, 2012) concluded that although practitioners espoused the theory and their beliefs, the practical application of high-quality interaction was frequently challenging for the teachers to enact. The findings are supported by a smaller study in Canada by Duval, et al. (2020). A New Zealand study showed that less than 10% of the total teacher-child interactions was SST, a finding which the researchers suggest is due in part to a lack of "intentional pedagogical strategies and conceptual knowledge teachers must employ to successfully engage in meaningful and reciprocal conversations aimed to extend children's thinking" (Meade, et al., 2013, p. 11). The research had limitations due to the size and generalizability; however, it has been included as a demonstration of the difficulties teachers face in implementing theory into practice, specifically concerning teacher-child interactions and SST. Other possible contributing factors are low staff ratios (DfE, 2017b) and teachers underlying values and beliefs of play-based pedagogy (Mead, et al., 2013).

An exciting development is an evidence-based study on a professional development (PD) program, the Fostering Effective Early Learning (FEEL), designed to evaluate the impact of "Leadership for Learning" PD on ECE teachers and the indirect impact on children (Siraj, et al., 2018). The findings showed notable improvements in overall environmental quality and an overall effect on curricular and interactional quality.

Interaction During Play

The contemporary view is that children are treated as active agents in their learning, and their unique experiences coupled with stimulating, flexible and responsive teachers should enhance their learning experiences (Hayes, 2019). During play, the child's interests govern how an

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interaction with the teacher continues and that control ensures that the child is engaged in the process (Weisberg, et al., 2013). At this time, the teacher can look for teachable moments and incorporate scaffolding to support learning by building on the child's interests (Weisberg, et al., 2013). Teachers have an essential interactive role during children's play either as an active participant in the play, as an observer who gets involved in offering guidance to support further learning or to model adaptability and problem-solving strategies to help children resolve conflicts (Ashiabi, 2007). Conversely, when teachers exert control and direct children's play to impart academic learning, it has been compared to "chocolate-covered broccoli" (Bruckman, 1999, cited in Pyle and Danniels, 2017, p.279).

An alarming trend in ECE is that play seems to have been dichotomised from learning, and that tensions arise for teachers faced with the challenge of allowing children more time to engage in child-initiated play or conversely engage in direct instruction of curriculum content (Pyle and Danniels, 2017). The trend stems from both a policy level within the United Kingdom (Jarvis, 2018) and the pressure to introduce academic content to prepare children for school competencies (Palmer, 2015; Hedegaard, 2020; Taylor and Boyer, 2020). Children's perceptions of play and learning as isolated or interconnected constructs are grounded in their experiences in their classroom (Taylor and Boyer, 2020). Thus, from a child's perspective, when teachers engage in play with enthusiasm and are playful in their communication during play, they gain an understanding that the teacher is a co-player and become more willing to share their ideas (McInnes, 2019). This, in turn, removes the dichotomy of play and learning and how the adult is perceived from the child's perspective.

UNICEF (2018, p. 7) states that "play is one of the most important ways in which young children gain essential knowledge and skills". Palaiologou (2017) argues that play is the intrinsic context in which development occurs; thus, the adult's role is to facilitate play through quality interactions and SST (Siraj-Blatchford, et al., 2003). The teacher's interaction sustains and extends the complexity of the play by provoking deeper thinking to enhance the learning (Taylor and Boyer, 2020).

Teacher-child interaction during play is complex. On the one hand, it is used to enrich and promote deeper, more intricate play and encourage socio-emotional skills development. On the other hand, teachers could take over and disrupt it (Trawick-Smith, 2012; Pyle and Danniels, 2017). Being responsive and engaged in the moment enables teachers to seize the moment to be a facilitator of play that enhances learning and thinking that is meaningful within the context of play.

Interaction to Promote Thinking and Understanding

It is essential for teachers to stimulate children to master the art of thinking and channel their innate curiosity towards deeper understanding. Meade, et al. (2013) indicated that SST opportunities are frequently missed and that highly qualified teachers enacted and sustained SST more frequently than unqualified teachers, although only 10% of the interactions were SST.

The encouragement of interactional dialogue in ECE is associated with quality teaching and learning. However, the intuitive timing (Laevers, 1998) and how teachers ask questions is fundamental for them to be effective. The use of well-designed open-ended questions can stimulate higher order thinking and extend the interaction's complexity by building on the child's current knowledge (Houen, et al., 2016). However, there are levels of quality questions that stimulate thinking, thus orchestrating degrees of cognitive complexity (Hattie, 2017). It is essential to acknowledge that, specifically when asking quality questions worthy of thought, rather than easily retrieved information, teachers need to give children time to think and respond; correspondingly, teachers then have more time to think and formulate more cognitively complex

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questions (Walsh and Sattes, 2015). A recent study suggests that children require numerous sustained individual interactions with the teacher in order for better executive functioning and literacy outcomes (Langeloo, et al., 2020). This finding supports the notion that “development takes place through progressively more complex interactions” (Bronfenbrenner and Morris, 2007, p. 797); thus, proximal processes must occur consistently over extended periods and be contextually meaningful to be developmentally effective.

Interaction to Promote Language

Vygotsky asserted that thought development was shaped by language and that children learnt to think logically by internalising speech (Vygotsky, 1986). Children's cognitive development is underpinned by social interactions with more knowledgeable others within their community and with the environment (Vygotsky, 1986). Vygotsky (1994) posits that children need continuous, direct interaction with an adult in order for speech to develop to a sophisticated level.

Several studies have investigated the interactions between teachers and students, and the findings largely support the assertion that most teacher-child interaction is an initiation-response-feedback (IRF) pattern (Walsh, 2011; Muhonen, et al., 2020) or related to classroom management and instructions. Myhill (2006) argues that a teacher's classroom talk can support or impede student learning. Barnes (2010) supports this argument by stating that the right kind of talk is the opposite of having the correct answer but instead can engage children in processes and exploration, thus facilitating learning by making connections in a meaningful way.

Internationally, ECE teachers are increasingly challenged with rising numbers of children who speak a different language at school than their heritage language. Many children speak more than two languages, and young children are learning their school language at the same time as they are developing their heritage language (de Sousa, 2017). Walsh's (2011) discourse about second language learners posits that teachers usually do not give students enough wait time to answer a question and thus intervene too frequently and too soon. When teachers intervene, the vocabulary and language used are less complex and more non-verbal language and gestures are used than with first language speakers (Langeloo, et al., 2020). Thus, the teacher needs to adjust the complexity of the interaction to engage the child while still offering effective learning opportunities that extend the children's learning based on their prior knowledge and experiences. Langeloo, et al. (2019) stress the importance of a teacher altering her interactions specifically for multilingual children. This research is very relevant due to globalisation and the increased number of multilingual children in ECE worldwide.

The Role of the Environment for Interactions

Children learn and develop through actively engaging and interacting within their environment (Bronfenbrenner and Morris, 2007). However, each child relates differently to experiences, and that response determines the influence of the environment on the development of various dimensions of a child's character (Vygotsky, 1994).

UNICEF (2018) highlights the necessity of an enabling environment in quality ECE by stating, “environments that promote play, exploration and hands-on learning are at the core of effective pre-primary programmes” (p.8). The environment needs to be arranged in a way that invites children's curiosity and enhances thinking skills. The environment then provides both the child and the teacher opportunities for dialogue where the teacher is tuned in and actively listening and

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following the interests of the child and can then extend the learning within a meaningful context (Purdon, 2016).

The REPEY study specified 'pedagogical framing', which is the behind the scenes work that teachers do to provide a stimulating physical and intellectual learning environment (Siraj-Blatchford, et al., 2002). The learning environment is reasonably easy to enhance and can have an immediate impact on the quality of children's play opportunities (Hayes and O'Neill, 2019) and can thus create opportunities for quality interactions and scaffolding within the child's zone of proximal development (Siraj-Blatchford, et al., 2002).

It would appear that there is a collective need for early childhood educators to offer a range of learning opportunities in stimulating environments from an early age (Garcia-Carrión and Villardón-Gallego, 2016). The Reggio Emilia approach by Malaguzzi identifies the environment as the third teacher (Gandini, 2011). Based on Malaguzzi's premise, a recent study showed how teachers performed an audit of the learning environment, identifying how the space was used, if the space was engaging for the children and how they could incorporate provocations to enhance and sustain the play experiences and spark discussions for learning (Loyola, Grimberg and Colomer, 2020). The "Spatial Design Thinking Process" model (Loyola, Grimberg and Colomer, 2020, p. 8) involved collaboration with the children, therefore, giving the children a voice in creating their multiliterate learning environment and making the spaces meaningful to them.

Discussion

Considering the current global pandemic, it would be remiss not to mention the potential for future research into the impact that wearing masks and remote learning is having on teacher-child interactions and child development. COVID-19 protocols recommended by UNICEF (2020) compel teachers to wear face masks the entire day and keep physical distance between children. Different countries have responded to the challenges of ECE during the pandemic in diverse ways, with multimodal remote learning adding to the complexity of the educational environment. Countries that are offering any modality of remote learning have faced several challenges including equitable access to digital platforms but also where the "difficulties in replicating the teacher/student interactions from an in-person learning setting – are even more pronounced in pre-primary education" (Nugroho, et al., 2020, p. 7). Children can adapt and are resilient; however, they are the recipients affected by the diverse quality of experiences (Hayes, 2019).

There is a significant and frequently cited need for professional development and investment in high-quality teacher training programs in ECE to hone and develop teaching skills (OECD, 2018). Mathers (2021) supports this view arguing that the complex cognitive knowledge of effective, high-quality pedagogy is not innate, but with explicit support in practical classroom environments, it can be and needs to be nurtured. The gaps in teacher knowledge and differences in skillsets require diverse training methods and mentoring (OECD, 2018). Studies confirm a correlation between the increased quality of teacher-child interaction as an impact of professional development (PD specifically targeted towards quality interaction and when the teacher takes the time and opportunities to reflect on practice (Peeters, et al., 2014). The finding suggests that reflective practice is essential for quality ECE provision (Dahlberg, Moss and Pence, 1999). To understand quality interactions, teachers need to see them in action (Pianta, et al., 2012). Supporting this view, Fisher and Wood (2012) argue that teachers can critically reflect on elements of their practice once they see recorded practice. Thus, they can consider the disparity between their espoused belief and pedagogical theories regarding interaction, and their enacted practice (Fisher and Wood, 2012).

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Professional development takes time and money, however the process of changing the innate beliefs, values and practice of teachers is complex and requires time and commitment from all parties in addition to expert trainers (Fisher and Wood, 2012). In contrast Hamre, et al. (2012) asserted that a 14-week in-service PD course on effective teacher child-interactions was sufficient to change teachers' practice, without providing feedback on teachers' classroom practice. However, the study indicated increased quality interactions when the teachers had undertaken a training course and watched videos of interaction in comparison to merely having the training. A meta-analysis suggests that extensive PD with various components such as workshops, individual and on-site support over some time would increase sustainable changes (Egert, Dederer and Fukkink, 2020).

The studies show that a significant correlation exists between specifically focused reflective practice and high-quality interactions in addition to PD that incorporates in-depth video analysis. However, limitations need to be considered, such as investment and research into PD that has proven efficacy, has an explicit focus on practice, is cost-effective and can be disseminated to larger groups (Hamre, et al., 2012). Ultimately, PD that does not lead to sustained pedagogical changes needs transformation to attain good quality interactions and improved outcomes for all children.

Conclusion

The literature review suggests an international awareness of the significance of high-quality teacher-child interactions; however, in spite of its importance, the prevalence of quality interactions is considerably low and is infrequently observed in practice. Since early 2000 when the EPPE research highlighted the importance of teacher-child interaction, there have been numerous studies supporting the findings. Yet almost 20 years later, recent research has revealed, through the evidence of practice, that teacher-child interactions are inconsistent and rarely of high quality.

There are suggested causalities for the privation of quantity and quality interactions. Firstly, teachers find it challenging to promote and sustain quality interactions with individual children (Wood, 1986; Meade, et al., 2013; DfE, 2017b; Muhonen, et al., 2020). Studies have shown small but significant correlations between class size and the quality of teacher-child interactions (Peeters, et al., 2014). Secondly, teachers tend to ask closed questions and are reverting to IRF feedback rather than sustaining the interaction and using questioning effectively. This may be because teachers are not enacting their training in practice. Teachers may be under pressure to cover the curriculum, thus "prioritizing of teaching (delivery and content) over learning (understanding)" (Myhill, 2006, p. 28). Thus, teachers may not plan quality questions worthy of thought rather than easily retrieved information and have time to formulate more cognitively complex questions (Walsh and Sattes, 2015). In an Australian study, the teacher's use of "I wonder..." prefaced statements seemed to invite the children to share their knowledge or 'have-a-go' thus the teacher was able to adjust their follow up questions and responses to scaffold their learning in the moment (Houen, et al., 2016). Although the research had limitations, due to it being a single-case qualitative study, it would be an avenue for a future large-scale research focus on teacher question design. Thirdly, teachers are challenged with time to reflect on how they interact with students (Khong, Saito and Gillies, 2019) and have ineffective PD to support their needs in this area.

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The results of this study suggest that high-quality interaction is not innate nor effortless for many educators. Considerable professional development and challenging training is needed to ensure teachers are consistently implementing it in their practice; although it has been identified as a “challenging form of pedagogy” (Gripton and Knight, 2020, p. 34). Other challenges included understaffing and finding time (Purdon, 2016); however, in one study a spontaneous 18-turn conversation took only one minute and 12 seconds, thus negating the limitation of time somewhat (Carr, 2011).

The researcher acknowledges that there are limitations to this study. The principal limitation is that the selection of literature reviewed is by no means exhaustive. The literature was initially selected using key words. After initial reading a scoping review approach to identify the key concepts and a snowball method of refining relevant studies and a search for longitudinal studies within the specific age group in addition to a focus on quality. Nonetheless, the researcher believes that the literature research has merit and can be used to inform policy, teacher training and targeted PD to improve pedagogy and thereby improve experiences and outcomes for children in early childhood education (DfE 2017a).

These findings raise urgent questions about ECE practitioners' efficacy in their initial pedagogical knowledge (Mathers, 2020) and the efficacy of ongoing CPD. However, an unexpected finding was video-based PD's efficacy in changing teachers' perceptions and practice using quality interactions. This finding has significant global implications for initial teacher training, early years settings and policymakers.

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