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Embedded Learning Support Practices for Primary Caregivers of Autistic Children

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ABSTRACT

Providing quality naturalistic and intentional learning opportunities to young autistic children strengthens their engagement and participation in home and education settings. Effective early intervention involves building parents' capacity to support children's learning and communication in the home. This study examined a training plus coaching intervention to support parents' implementation of embedded learning opportunities (ELOs) and complete learning opportunities (CLOs) within naturally occurring play routines. This type of Embedded Learning Support (ELS) is a novel area of research in early intervention in Aotearoa, New Zealand. Three parent–child dyads participated in this study, each including a preschool autistic child. A single group pre-test/post-test study explored intervention impact. Results showed that group training and individualised home-based coaching effectively supported parent capacity and confidence to create meaningful and sustained interactions with their children. Parents valued the systematic and intensive nature of ELOs and CLOs. This paper will highlight the relevance of these findings to the existing literature on parent-implemented interventions and naturalistic and intentional practices.

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Autistic preschoolers; naturalistic interventions; intentional support; embedded learning support; complete learning opportunities; parent training plus coaching

Introduction

Parents of young autistic children often report early communication skills as an area of focus and motivation for seeking support through early intervention (Keen et al., 2016). In Aotearoa, New Zealand, recommendations for naturalistic and intentional approaches are included in the Aotearoa New Zealand Autism Guideline: Third Edition (Whaikaha Ministry of Disabled People and Ministry of Education, 2022). This influential guiding source also endorses culturally relevant parent capacity-building practice as a fundamental principle in early intervention. These recommendations align with the practices used by publicly funded early intervention providers who have adopted an ecological and family-centred approach that promotes the use of naturalistic, family-focused services (Kasilingam et al., 2019; Liberty, 2014; Mataiti, 2020; McWilliam et al., 2020) that are collaborative and culturally responsive practices provided in families' homes or local inclusive early education settings (Macfarlane & Macfarlane, 2013; Ministry of Education, 2020).

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The focus on families and natural environments is based on international research that suggests the best context for promoting early communication skills is during everyday activities and daily routines (Salisbury et al., 2018), with support for parents to develop their capacity to maximise their child's chances of reaching individual communication milestones using developmentally appropriate approaches (Brown & Woods, 2016; Kemp & Turnbull, 2014). Reported outcomes of such early interventions include the development of critical skills and competencies in early communication, such as expanded vocabularies and increased joint attention (Rogers & Dawson, 2010). Emphasis should be on the quality and nature of early parent–child interactions between caregivers and naturalistic and intentional supports for sustained positive outcomes for both parents and children.

Embedded interventions are recommended in the broader early intervention literature with theoretical, practical, and empirical support (Division for Early Childhood, 2014). They are associated with both naturalistic and systematic (or intentional) approaches. While naturalistic approaches emphasise the importance of child-initiated play and promote frequent learning opportunities and participation in naturally occurring activities of high interest to the child through modelling, shaping and natural reinforcements (Johnson et al., 2015; Snyder, McLaughlin, et al., 2018), systematic approaches emphasise individualised intentional support based on data-informed decision-making (Ledford et al., 2019). The strength of these combined approaches lies in the effective development of functional skills that promote connectedness and participation in everyday routines and activities (Salisbury et al., 2018; Sandall et al., 2008; Snyder et al., 2013).

Embedded Learning Support (ELS), referred to in other writings as embedded instruction, refers to a systematic approach to supporting positive teacher/caregiver and child interactions that optimise learning in contextually relevant naturally occurring activities, routines, and transitions (Snyder et al., 2013; Snyder, McLaughlin, et al., 2018). A unique feature of ELS is the use of embedded learning opportunities (ELOs) and complete learning opportunities (CLOs) (in other writings, referred to as complete learning trials). These are designed to maximise the child's engagement and participation through systematic, development-enhancing, child-initiated and adult-guided interactions that occur in contextually relevant and interest-based interactions (Sandall et al., 2008; Snyder, McLaughlin, et al., 2018). Building blocks for ELS involve the use of ELOs containing a combination of natural and planned cues, sequences, or prompts, which are reflected in a reciprocal interaction between child and adult actions. An ELO becomes a CLO when a positive consequence or feedback is used within the interaction to strengthen child learning.

Effective embedded interventions rely on the inclusion of both a training and coaching component, as it uses systematic, intentional, and interactional procedures to ensure positive engagement and participation for children and individualised support for adults to reinforce skill acquisition and enhance self-reflection (Friedman et al., 2012; Salisbury et al., 2018; Snyder, Hemmeter, et al., 2018). Coaching is a relatively new practice within the New Zealand early intervention context as part of the shift away from direct service towards a more naturalistic family-focused approach (Mataiti, 2020; Ministry of Education, 2007). Although highlighted as a key practice in the new learning support framework, He Pikorua (Ministry of Education, 2020), the description of coaching emphasises reflection and empowerment rather than specific references to aspects of coaching often described internationally. Moreover, New Zealand's early childhood and early intervention services have historically

been more aligned with naturalistic elements of embedded interventions, and the use of ELOs and CLOs has not yet been systematically introduced to parents nor examined.

Given the potential of such approaches within the New Zealand early intervention context, there is an ongoing need for training and coaching approaches that introduce parents to systematic and interactional processes to embed new skills in a variety of daily routines and activities (Salisbury et al., 2018; Swanson et al., 2011). International research provides evidence that parent-implemented interventions can positively impact parents' ability to provide development-enhancing interactions with their child (Brown & Woods, 2016; Salisbury et al., 2018). However, more research is needed within the New Zealand early intervention context to determine whether CLO-focused training and coaching would support parents in being more intentional in their interactions with their autistic child and in maintaining these practices over time, within their natural context.

This study, therefore, explored the impact of a training plus coaching intervention on parents' implementation of ELS practices, specifically CLOs (Pretorius, 2018). The broader research project collected data from both parents and children. However, for this manuscript, we focus solely on parent data. Specifically, we focus on observational measures of 'parents' implementation of CLOs, their perspectives on changes in their confidence and competence using CLOs with their autistic child, and their views on its benefits and outcomes for their family. Three research questions guided the project:

(1) How do New Zealand parents implement complete learning opportunities (CLOs) with their autistic children, following group training and at-home coaching?
(2) How do New Zealand parents perceive changes in their confidence and competence in using CLOs after receiving targeted training and coaching?
(3) How do New Zealand parents perceive the outcomes and benefits of training and coaching designed to support their implementation of CLOs with their autistic child?

Materials and Methods

Research Design

A small exploratory group pre-test/post-test design was utilised to explore the impact of group training, followed by individualised coaching. The intervention's ecological nature placed the setting and participants at the heart of this study as a powerful vehicle to promote practice change. The practitioner-based nature of this research allowed for a systematic examination of the data while drawing from the perspectives of an experienced practitioner to empower families in contextually responsive ways. Ethical approval for the study was obtained from the university human ethics committee (NOR 17/55).

Participants

Three parent-child dyads were recruited from a waiting list of a local early intervention service using the following eligibility criteria: the child a) was in the 2 to 5 years range, b) had an autism diagnosis confirmed through an independent agency, c) had no hearing or vision differences, but had limited functional communication as described by the parent

during the intake conversation. For the purpose of recruitment, limited functional communication was defined as fewer than 10 communication actions (spoken, gestural or body movements). The centre director introduced participants to the purpose and procedures of the study through a detailed information sheet and sought their written consent. They were assured that their participation or non-participation in the study would not affect their child's services from the early intervention centre. Two of the parents identified as New Zealand European, while the third was of Filipino descent. Of the three parents, two identified as female and one as male. The participating children were aged 38 months, 40 months, and 52 months, and all reported as male. During the intake conversation, all three parents indicated a strong desire to learn effective strategies to support their child's early communication and create sustained, development-enhancing interactions with their children. According to the 'parents' report, all three children presented with fleeting attention, had limited spoken communication, and mostly engaged in solitary play. Parents identified broader goals for their children, which included increased participation in family activities and sharing turns with siblings. We also asked parents to identify current communication targets (priorities) for their children, which would be refined and reviewed during training and coaching sessions. For each of these children, this included the use of single words and/or a gesture to communicate preferred actions or basic needs.

Overview of the Intervention

The first author, a Speech and Language Therapist with more than 20 years of experience in the early intervention sector, facilitated the training and coaching intervention and conducted the data collection and analysis for this study, with support from a supervisory research team and a research assistant. Parent implementation data and data from rating scales were collected at families' homes, at both pre- and post-intervention. Parents participated in group training workshops and individualised coaching visits. Both coaching visits and data collection focused on interactions during naturally occurring interactions initiated by the child or elicited by the parent by incorporating their favourite toys, objects, or activities. For data collection, two play conditions were specified: 1) toy and object play (e.g. block construction, toy cars, books, or puzzles) and 2) people play (e.g. chase, tickles, balloons, trampoline play or bubbles). A detailed description of each of these components will follow.

Group Training Workshops

Parents participated in four group training workshops over four weeks, lasting two hours each. The content and structure of the training workshops were adapted with permission from embedded intervention training materials (cf., Snyder et al., 2013; Snyder, McLaughlin, et al., 2018). Training workshops contained explanations and demonstrations of ELS practices, video examples, and group discussions. Workshops included opportunities for individualised action planning, problem-solving discussions, and peer networking. During workshops, parents were guided to refine their children's communication priorities, and training focused on identifying measurable and meaningful communication targets within the context of everyday activities and routines,

using CLOs. The Parent Interaction Plan (PIP) was the primary planning tool parents used to plan and create CLOs and use interaction-promoting strategies such as intentional pausing, tuning in, interpreting, and copying or matching the child's interests, actions, sounds or words.

Individualised Coaching Home Visits

Following training, parents received eight consecutive weekly coaching home visits. The project-developed coaching protocol was informed from the broader coaching literature (Brown & Woods, 2016; Friedman et al., 2012; Kemp & Turnbull, 2014; Snyder et al., 2015) and involved a general sequence of strategies to support parents' use of ELS practices. Visits started with a greeting to establish a connection with the family, followed by conversation and information sharing, observations of the parent–child interaction, and guided feedback. In-situ support was given whenever parents requested it, and it involved demonstrations, modelling, and triadic interaction support (parent-child-interventionist). The coaching visits concluded with problem-solving and reflection, creating a personalised action plan, setting a date for the next visit and a greeting. Feedback and planning were jointly recorded on the PIP at the home visit, and both the parent and facilitator held copies.

Data Collection Procedures

Observational Measures

Parents' implementation of ELOs and CLOs was the primary effect under investigation. The researcher recorded a total of 12 short parent–child interactions across the two data collection points: one toy-and-object video and one people-play video for each dyad at each time point. A combined total of 92.27 minutes, that is, 92 minutes and 16 seconds or 5536 seconds, was recorded. Video lengths differed for each recorded observation (duration Mean = 15.38; SD = 2.69). Consequently, data were transformed into rate data from seconds. Scores represented the number of opportunities or occurrences of target action codes per minute of parent–child interaction. Parent–child interactions were coded using a purpose-designed observational coding system with operational definitions, informed by the Embedded Instruction Observation System for Teachers, EIOS-T (Bishop et al., 2011). This coding system counted the number of ELOs and CLOs parents used to elicit target communication actions (TAs). Coding procedures allowed for parents to pair different strategies at various points in the interaction. Once coded, parent observation data identified the total number of ELOs, CLOs (i.e. interactions in which all parts of CLOs occurred), and the component parts of each CLO. The individual components of CLOs included 1) the nature of learning opportunities created, 2) strategies used to create learning opportunities, 3) additional help strategies, 4) strategies used to complete learning opportunities, and 5) the child's use of the target action (i.e. desired communication). To illustrate how CLOs are coded in the context of an ongoing interaction, the following example is provided below.

> In a bubble-blowing game, the child's target action was to respond to a choice question, e.g., 'Do you want it high or low?' by using a single word. To create the learning opportunity, the parent positions herself at the child's level, holding the bubbles ready and asking, 'Do you

want it high or low?' and then waits for a response (creates a planned opportunity). The child does not respond with a choice; instead, only echoes the parent's question (no target action occurred). The mother then prompts him with a question, saying, 'Do you want it high?' and then waits for a response (provides additional help). The child then responds by saying, 'low' and points to the floor (the target action). The parent confirms the child's choice by saying, 'Oh, you want it low this time!' and blows bubbles quickly (naturally occurring response with descriptive feedback).

Reliability of Coding

The researcher was the primary observer and coder. A research assistant was employed and trained by the first author to use the purpose-developed training manual for coding a portion of the data to ensure consistency and accuracy of scoring. Training sessions took place over four 3-hour sessions. Following training, the research assistant independently coded 33% of parent data from a cross-section of parent–child interactions, video conditions and time points. Interobserver agreement (IOA) for parent actions data was calculated as the occurrence of agreement divided by the occurrence and the non-occurrence agreement plus disagreements, with the result multiplied by 100%. The mean IOA on parent implementation data was 87.91%.

Parent Completed Measures and Informal Narratives

Two investigator-developed parent-completed measures were utilised for this study, using six-point Likert-type rating scales. Parents rated their interactive actions used to encourage engagement and sustained interactions with their children using the Parent Interactive Actions Rating Scale. This scale included 20 statements related to being face-to-face with the child, creating predictable play routines, waiting, imitating sounds or actions, and adjusting their level of language and support to match the child's skill; these were rated from *not good at all* (1) to *exceptional* (6). Parents rated their experiences with ELS and their satisfaction with the training and coaching intervention using a 20-item Intervention Rating Scale; these were rated from *strongly disagree* (1) to *strongly agree* (6). This rating scale was informed by the Intervention Rating Profile-15 (Martens et al., 1985) and the Canadian Occupational Performance Measure, COPM (Carswell et al., 2004). In addition to the rating scales, parents' interactions with the facilitator at the post-intervention home visit generated responses related to their perspectives and experience throughout the project, as well as their reflections on perceived outcomes following their participation in the study. These responses were audio-recorded during a short feedback session with each family, using a prompt sheet with four open-ended questions.

Data Analysis Procedures

Descriptive statistics were used to quantify and describe changes in the interactive actions of adults for observational measures and to report on parent perspectives through parent-completed measures (Bordens & Abbott, 2011). Both coded observational data and questionnaire data were recorded in Excel, using summary spreadsheets, and presented as tables and graphs for each dyad. Data were calculated as mean scores across the three parent–child dyads at the pre- and post-intervention data collection points. Data were presented as a group for efficiency in line with a pre-

post pre-experimental group design as trends across dyads were similar. Data from informal feedback from parents were transcribed and then analysed using a general inductive approach to identify patterns and themes and offer examples of parent voices (Thomas, 2006). Patterns and themes have been presented in a broader practitioner-based paper (Pretorius et al., 2020).

Results

Parents' Use of Embedded Learning Support Practices

The first research objective examined the impact of the training plus coaching intervention on parents' implementation of ELS practices – specifically the use of ELOs and CLOs. Observational data on parents' implementation of ELOs and CLOs are presented as rate data to allow comparability across videos of different durations, with scores representing the number of opportunities or occurrences of target action codes per minute of parent–child interaction.

ELOs and CLOs

Figure 1 presents changes in the rate of parent-implemented CLOs and ELOs and the occurrence of target actions (TAs) in the context of ongoing play activities. Overall, results showed an increase in the occurrence of CLOs, an increase in child TAs occurring in the context of successfully implemented CLOs, and a decrease in parents' use of ELOs. The most notable shifts were seen in parents' successful implementation of CLOs from pre to post (increased by 1.41 occurrences per minute) and implementation of CLOs where child TAs also occurred (increased by 1.46 occurrences per minute). To further explore these results, Figures 2 to 5 summarise changes in the rate of parents' use of individual components of CLOs.

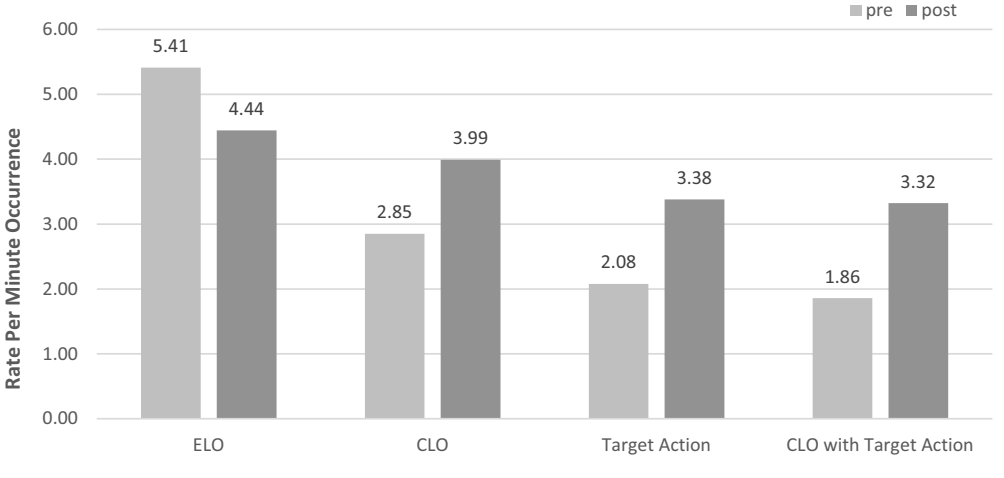

Figure 1. Parents' use of embedded learning opportunities (ELOs) and complete learning opportunities (CLOs). ELO – Embedded learning opportunity; CLO – Complete learning opportunity.

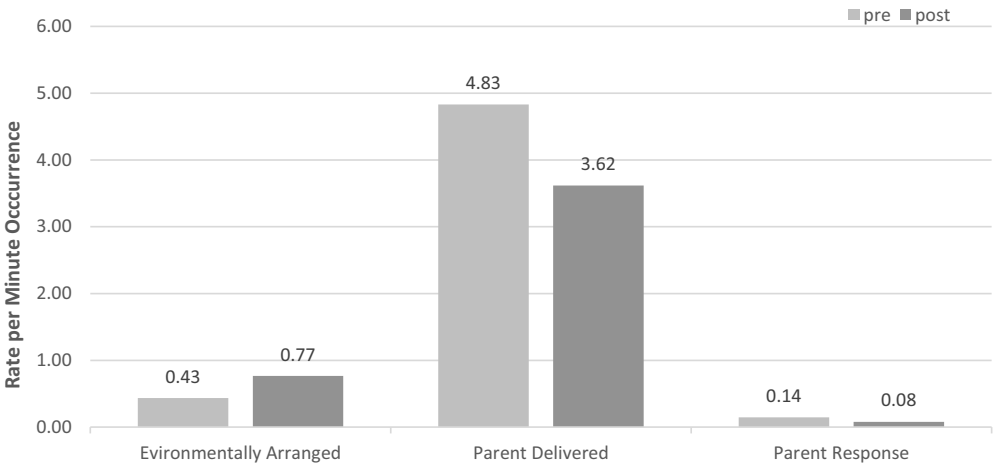

Figure 2. Nature of learning opportunities created by parents.

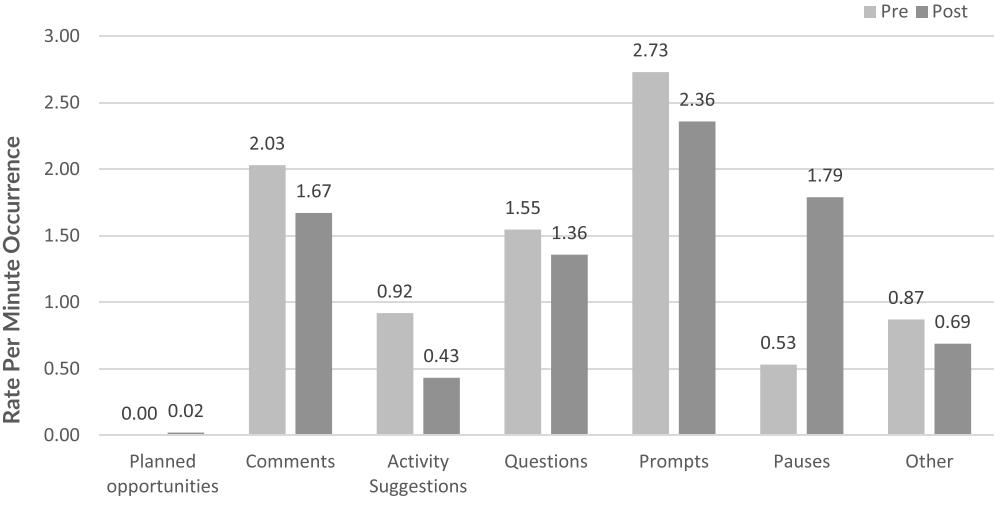

Figure 3. Various ways parents created learning opportunities.

Creating Learning Opportunities

Overall, data showed that while parents' use of parent-delivered strategies decreased by 1.21 occurrences per minute, environmentally arranged strategies increased by 0.34 occurrences per minute (see Figure 2). Data showed a strong representation of all types of strategies at both data points (see Figure 3). These range from most represented, that is prompts (visual, verbal, and gestural), to least represented, creating opportunities to communicate (placing a high-interest toy or object in the child's view without commenting). There was a downward trend in the use of comments, activity suggestions, questions, prompts, and strategies termed as 'other' (not listed in the coding manual). Activity suggestions decreased the most (by 0.49 occurrences per minute), and the most notable positive shift occurred in parents' use of pausing, which increased by 1.26 occurrences per minute.

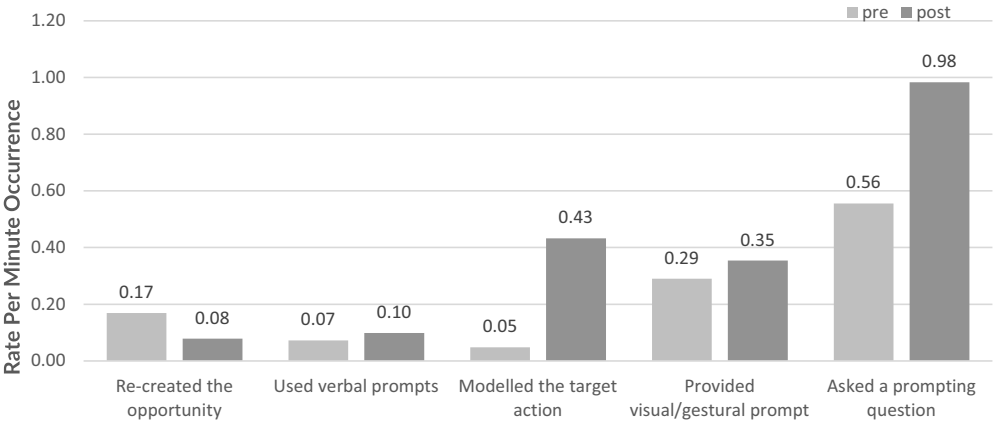

Figure 4. Parents' use of additional help strategies as a component of complete learning opportunities.

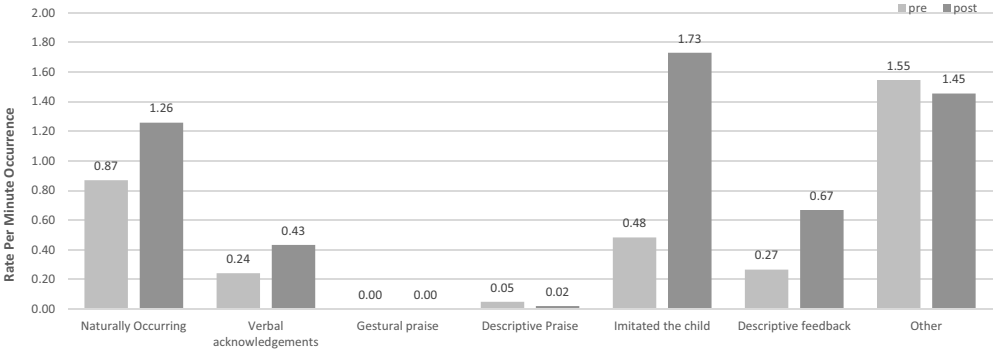

Figure 5. Various ways parents completed learning opportunities.

Providing Additional Help. Data showed an increased occurrence of all types of additional help strategies except for a slight decrease in occurrences where parents re-created the learning opportunity, that is, repeating natural or planned cues to create the learning opportunity (see Figure 4). Pre-post comparisons showed the most noticeable increase in the use of prompting questions (increased by 0.42 - per minute) and modelled target action, which increased by 0.38 occurrences per minute.

Completing Learning Opportunities

Figure 5 shows that gestural and descriptive praise occurred the least; all other responses were well represented at both data points. Where parents imitated the child, occurrence increased by 1.25 per minute. Further noticeable increases occurred in parents' use of naturally occurring responses (increased by 0.39 - per minute) and descriptive feedback, which increased by 0.4 per minute from pre to post.

Parent Ratings and Informal Feedback

Table 1 shows the mean ratings of parents' reported skills in implementing interaction-promoting practices. Parents reported seeing noticeable improvement in implementing each of the ELS practices mentioned in the questionnaire; they reported feeling more skilled in using these practices. The largest shift was in their reported ability to adjust how they talked to their child (pre $M = 3.00$; post $M = 5.67$). They also reported an improved ability to offer and name options/choices and include their child's interest (both ratings increased from pre $M = 3.00$ to post $M = 5.33$). Furthermore, parents reported notable positive changes in their use of descriptive language, fun, predictable play sequences, and selecting the right level of help for their child (all these ratings increased from pre $M = 3.00$ to post $M = 5.00$).

Narratives from parents reflected the changes seen in observational data and parent ratings. Parents described feeling more competent in their use of ELS practices. Specifically, they shared that using ELOs and CLOs was instrumental in helping them support their child's attempts to communicate, as reflected below:

> I am talking about the complete learning opportunity [CLO], like when I am making a comment [creating an opportunity], and he repeats what I am saying [TA], and then I affirm what he says [verbal acknowledgment to complete the opportunity], and then we go over it, and when he doesn't, I have that in the back of my mind that okay, we have to exit now [descriptive feedback] because obviously, he is not responding, so we will try it again later.

Parents confirmed that they changed how they talked to their children and modelled language during interactions as a positive outcome of the training and coaching intervention. For example, one parent commented that 'asking questions was very common for me,

Table 1. Means and standard deviations on parent interactive actions ratings.

	Pre		Post	
Parent Interactive Actions	*M*	*SD*	*M*	*SD*
I adjust the way I talk to help my child understand what I am saying.	3.00	1.00	5.67	0.58
I join in with my child's solitary play by including his/her interests and ideas.	3.00	1.00	5.33	1.15
I offer my child choices or options by showing and labelling his/her options.	3.00	1.00	5.33	0.58
I join in with my child's play by commenting on or describing what I see him/her doing.	3.00	1.73	5.00	1.00
I join in with my child's play by turning it into a game with predictable language and a sequence of actions.	3.00	0.00	5.00	1.00
I know how to select the correct level of help my child needs.	3.00	1.00	5.00	1.00
I encourage my child to take the lead about what and how we play with toys/objects or actions.	4.00	0.00	5.67	0.58
I stop what I am doing to pay attention to what my child likes to do with a toy.	3.33	1.15	5.00	1.00
I join in with my child's play by copying his/her sounds and words.	4.00	0.00	5.33	1.15
I adjust the way I talk to match his/her skill level.	3.33	1.15	5.00	1.00
I wait for my child to communicate something to me.	3.33	1.15	4.67	1.53
I create opportunities for my child to communicate a need towards me.	3.67	0.58	5.00	1.00
I tell my child what to do by offering suggestions where needed.	3.67	0.58	5.00	1.00
I let my child know what to do by showing him/her when needed.	3.67	1.53	5.00	1.00
I join in with my child's play by copying his/her actions.	3.67	0.58	5.33	1.15
I adjust my physical level to get face-to-face with my child.	4.33	1.15	5.33	0.58
I pause to listen to my child's sounds or observe the actions my child is using while playing.	4.33	0.58	5.33	1.15
When my child communicates a need towards me or communicates towards me, I respond immediately.	4.33	0.58	5.00	1.00
I encourage my child's efforts by using words and gestures.	4.33	0.58	5.00	1.00
I give my child help to communicate when needed.	4.33	0.58	5.00	1.00

Note. Parents gave ratings ranging from *not good at all* (1) to *exceptional* (6).

but as soon as I was practising making comments, we were able to encourage him to talk, not just to interact with actions'. Parents spoke about their improved skills of tuning in (responding to their child's interests, ideas, and comments), which resulted in their child staying in interactions longer. One parent specifically reported how the use of interactive positioning and active engagement changed the way they played with their child:

> Knowing ways to speak to him, getting down and playing with him instead of trying to talk to him from a distance, actually, sitting down and playing with him. I never really used to do that – sit down and play with him that much because I always thought he is happy on his own; just sort of left him to it.

Social Validity: Parents' Experiences and Perceptions

Table 2 summarises parents' agreement with statements related to all aspects of the intervention, ELS practices, and their perspectives on the training workshops. Parent ratings were overwhelmingly positive; average ratings exceeded five, showing strong agreement and appreciation of this intervention. Results from the rating scale were echoed in parents' informal feedback about their experience attending workshops and receiving at-home support. Parents described the workshop component as meaningful, supportive, and reflective. They reported that the systematic introduction of ELOs and CLOs through workshop-type training provided them with the necessary tools to create positive and successful learning experiences for their child at home. One parent described the benefits of learning how to use CLOs by stating, 'knowing how to try and start something and to keep it going, and the benefit of closing it off and giving praise at the end definitely helps'. Informal feedback also included sentiments of increased knowledge on creating more sustained interactions with their child, for example, learning new ways of speaking to their child, getting down at the child's level to interact with them and actively engaging with their child.

A high level of satisfaction was reported on the Intervention Rating Scale and the informal feedback concerning the combined benefits of the training and coaching components. Parents said that the workshops gave them space and time to plan how to use ELOs and CLOs with their children at home, using the Parent Interaction Plan. They also reported that the systematic introduction of ELOs and CLOs through workshops gave them the confidence to transfer their learning to other activities at home and share their skills with other family members. Supports provided during coaching, such as video feedback, were viewed as highly supportive, practical, and effective in developing their self-reflection skills, which strengthened their ability to implement ELS practices independently. One parent stated:

> When I am playing with him, sometimes I don't remember what I've said or what I am doing. But having the videos and looking back on them and actually seeing I was asking a lot of questions – closed kind of questions, either yes or no answers. It has been good to see it, knowing that's what I do and that's not really helping him.

Other benefits and positive outcomes described positive family outcomes from learning to embed practices in a broader range of family activities. One parent mentioned that 'we are going out as a family now, and we enjoy weekends together'. Parents spoke of improved communication and harmony with their partner because of a 'shared understanding of what to do next'. They referred to reduced stress and chaos in the home due

Table 2. Means and standard deviations on parents' ratings of the intervention.

Perceptions of Embedded Learning Support	*M (SD)*
This intervention was effective in supporting my child's communication skills.	6.00 (0.00)
This intervention has taught me to follow my child's interest in play.	5.67 (0.58)
This intervention has given me the necessary skills to improve my child's communication skills.	5.67 (0.58)
This intervention helped me engage in more meaningful interaction with my child.	5.67 (0.58)
This intervention enabled me to set appropriate communication goals.	5.67 (0.58)
This intervention is an acceptable intervention for increasing my child's communication skills.	5.67 (0.58)
I will recommend this intervention to other parents.	5.67 (0.58)
This intervention is appropriate for a range of children.	5.67 (0.58)
I am willing to use this intervention at home.	5.67 (0.58)
This intervention has not resulted in negative side effects for my child.	5.67 (0.58)
This intervention was a good fit for our family and our cultural values.	5.67 (0.58)
Perceptions on training plus coaching	***M (SD)***
Overall, being coached was beneficial to me.	6.00 (0.00)
The training workshops have equipped me to use strategies that promote interactions with my child.	5.67 (0.58)
The training workshops equipped me with the skills to use naturalistic instruction*.	5.67 (0.58)
Coaching has helped me implement these strategies more consistently.	5.67 (0.58)
I am satisfied with the experience of being coached.	5.67 (0.58)
Coaching has increased my knowledge of interaction-promoting strategies.	5.67 (0.58)
Coaching has increased my knowledge of naturalistic instruction*.	5.67 (0.58)
The training plus coaching intervention is suitable for parents.	5.67 (0.58)
The training plus coaching intervention was a good fit for our family and our cultural values.	5.67 (0.58)

Note. Parents gave ratings ranging from *strongly disagree* (1) to *strongly agree* (6); * The term naturalistic instruction is associated with previous iterations of Embedded Learning Support.

to improved communication and expectations around using ELS practices. Parents mentioned positive changes in their child's attempts to communicate their intentions. One parent's example was noticing a shift in their child's ability to verbalise choices and use words and phrases in back-and-forth interactions. Other comments mentioned their child being 'happier and calmer' due to an improved understanding of expectations, boundaries, rules, and successful participation in daily activities. Increases in positive child behaviour and emotional regulation were noted in light of positive shifts in children's ability to communicate their ideas and needs.

Discussion

Data from this study suggest that learning to use ELS practices such as ELOs and CLOs supported parents' confidence and capacity to support children's communication in everyday activities and resulted in a range of positive family outcomes. Findings from this study are discussed alongside current literature on naturalistic and intentional approaches to early intervention, parent-implemented interventions, and parent-capacity-building practices, and their significance within the New Zealand early intervention context.

Successful Implementation of Embedded Learning Support Practices

Observational data showed an increase in parents' use of CLOs, including a wider variety of strategies to provide additional help, such as verbal, visual, and gestural prompts, modelling target actions and using prompting questions. As parents' interactions became more systematic and intentional, children engaged in the target actions more frequently. These results are consistent with studies reporting on the

implementation of ELOs and CLOs by early childhood education teachers (Snyder, Hemmeter, et al., 2018). The extension of ELOs and, specifically, the introduction of CLOs to parents in the context of their homes is an important area of research, and studies such as *Embedded Instruction for Early Learning: Tools for Families* (Bishop et al., 2020) are examining embedded learning support for families more broadly. The outcomes of the present study are promising as the intervention demonstrates the positive impact on parents' use of systematic techniques such as CLOs, even within the context of a country in which systematic or intentional practices are not yet widely adopted.

Training Plus Coaching Supports Parent Capacity-Building

Most early intervention approaches for autistic preschoolers include parent education and individualised support within a family-centred service model (Dunst & Dempsey, 2007; Friedman et al., 2012). Consistent with the early intervention literature, a high level of parent participation is essential to achieving positive outcomes for the child. Positive parent reports about the training component in the present study suggest that parents valued the opportunity to learn practices systematically alongside peers while also having space for supported and shared action planning, discussion, and reflection. Research on parent education and support provides evidence for the usefulness of parent-to-parent networking, with benefits extended when workshops and training programs also involve a coaching component (Barton & Lissman, 2015).

The individualised coaching component in the present study guided parents to apply their knowledge of ELS practices in the context of naturally occurring interactions and activities. Professionals in early intervention recognise the importance of adult learning practices such as practice, observation, self-reflection, and feedback. These adult learning practices have been successful in establishing new skills but also in sustained outcomes, more so when facilitated in an ecological context (Kemp & Turnbull, 2014; Rush et al., 2003; Snyder et al., 2015). Results from the study align with the broader literature validating the importance of coaching supports designed to build the capacity of parents and caregivers within their natural milieu (Brown & Woods, 2016; Dunst & Dempsey, 2007; Salisbury et al., 2018).

The New Zealand Early Intervention Context

Our findings bring a valuable contribution to the current ecological and family-centred approach to supporting parents of young autistic children in New Zealand and other countries that adopt similar approaches. Providing parents with comprehensive training paired with individualised coaching support in applying ELOs and CLOs may provide much-needed reassurance and capacity to families at the early stages of their child receiving a diagnosis of autism. In New Zealand, the systematic introduction of ELOs and CLOs is not widely adopted, and intensive individualised coaching within homes or early learning settings is still a relatively new practice within early intervention. Coaching is described as a key practice in the He Pikorua learning support framework (Ministry of Education, 2020) and emerging as a recognised tool when supporting families in a family-

centred and routine-based intervention model (McWilliam et al., 2020; Ministry of Education, 2007). However, access to professional development is limited (Mataiti, 2020), and descriptions of coaching in the literature vary widely (Clarke et al., 2020; Mataiti, 2020). Our study highlights the need for more empirically validated coaching practices for professionals who support families seeking early intervention services.

Our findings demonstrated evidence of positive outcomes for three parents when they received intensive support to integrate ELOs and CLOs into contextually relevant everyday activities. This finding is important because it embodies a family-centred early intervention model and aligns with the recommendations of the Autism Guideline (Whaikaha – Ministry of Disabled People and Ministry of Education, 2022). While this guideline recommends the provision of carefully planned systematic instruction, these are often only available to families privately. However, the systemic and instructional nature of CLOs embedded in an ecological and naturalistic context could provide a natural bridge between behavioural interventions' systematic and structural supports and the ecological family-centred model endorsed by funded and non-funded intervention providers in New Zealand. Specifically, this intervention also provides a systematic structure to naturally occurring interactions using ELOs and CLOs, which is regarded in the literature as an effective practice for autistic children (Barton et al., 2014; Rule et al., 1998).

Limitations

The study implemented a descriptive pre-test/post-test design, and although reasonable steps were taken to control internal and external validity, the design is pre-experimental. The study was also conducted in a practitioner-based context in which the first author acted as the workshop facilitator, coach, and researcher responsible for data collection and analysis. While an IOA was reported for observational data, and efforts to minimise bias were employed, including member checks and reflective practice with supervision, the first author's multi-faceted roles should be carefully considered. Moreover, while the small sample size supported the depth of investigation for each family, the generalisation of results is limited. This limitation is important when investigating ongoing support for autistic preschoolers, a population known for its wide variability in skills and characteristics. Furthermore, this paper reports solely on parent data associated with ELS, specifically their experiences and the researchers' observations of CLO implementation. As a result, child-level data, such as child communication rating scales and structured observation of child communication, were not included within the scope of his paper, although they were documented in the broader research project (Pretorius, 2018). This reporting decision helped us focus this manuscript on 'parents' perceptions of change associated with targeted training and coaching.

Future Research and Clinical Implications

The present study provided parents with intensive support to create positive and contextually relevant learning opportunities to target children's early communication. For this study, targeted child communication actions were intended for generalised outcomes but practised in the context of a targeted activity within the families' home, involving activities that were highly preferred and familiar to the child. Future research could

investigate a broader range of activities, including daily routines, transitions, and novel activities, to strengthen conclusions about parents' independent use of CLOs. Future studies should also examine the fidelity of ELS practices across routines and activities using ongoing maintenance data, which could involve individual follow-up coaching or web-based coaching support. Finally, introducing ELS practices to other family members and other familiar interaction partners, such as early childhood service caregivers and educators, holds great promise. Joint training and coaching opportunities for caregivers and educators may present a unique opportunity for collaboration and consistent communication between home and community, thereby strengthening the support offered to autistic preschoolers.

Conclusion

The current study looked at the impact of a training plus coaching intervention to facilitate parents' use of ELS practices with autistic preschoolers. The research questions that guided this study related to changes in parents' use of ELS practices and reports on the social validity of the ELS practices and the supports provided. This study's findings demonstrated that a training plus coaching intervention successfully facilitated parents' ability to implement ELS practices during their interactions with their children. Observational data, parent ratings, and informal feedback demonstrated the value of intervention that empowers parents to participate in goal planning and develop their capacity to engage and actively extend their child's early communication. Learning was promoted through naturally occurring interactions and activities, using embedded learning opportunities (ELOs) structured as complete learning opportunities (CLOs). Results from this study support the core principles underpinning early intervention practices in New Zealand, namely family-centred and capacity-building practices. Parents gained mastery in using ELOs and CLOs. Parents specifically expressed their appreciation of the systematic nature of these practices.

We believe that the use of naturalistic and intentional interaction practices such as ELOs and CLOs within daily routines presents a significant opportunity within the New Zealand early intervention context. Embedded learning support offers a cost-effective, culturally responsive approach that meets the recommendations for intensive early intervention services while promoting positive outcomes for parents supporting preschoolers on the autism spectrum. To enhance these types of opportunities for families, there is a need to strengthen the coaching practices of early intervention practitioners in New Zealand and to support parents with a more systematic and intentional approach to working towards family priorities.

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Identity-first language (e.g., autistic toddler, child, individual) will be used throughout this manuscript for consistency and clarity and to honour the recommendations of self-advocacy groups in New Zealand and international groups such as the Autistic Self-Advocacy Network. We recognise that no one term is preferred by all people from the autistic and autism communities. However, we also acknowledge the growing desire among autistics to use terminology that reflects the beliefs that autism is something intrinsic to them and an important part of their identity.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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