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Observing Language Pedagogy (OLP): Developing and piloting a contexualised video-based measure of early childhood teachers' pedagogical language knowledge

Declaration

I, Sandra Mathers confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Word count

43,452 words, excluding references and appendices

Abstract

To support responsive decision-making in the classroom, teachers need flexible access to rich, well-organised and integrated pedagogical knowledge (Koehler & Mishra, 2009). The design of teacher programmes which effectively foster such knowledge rests on its successful measurement, so that relationships between teachers' learning experiences and their knowledge growth can be established. However, existing questionnaire-based assessments have thus far failed to capture dynamic pedagogical knowledge in a manner which allows relationships with practice and child outcomes to be established.

This study develops and pilots a **contextualised tool** for assessing the **dynamic pedagogical knowledge of early childhood teachers, in relation to oral language development**. Respondents watch three short videos of a practitioner interacting with children, and identify the strategies used which may support children's language skills. This use of 'teacher noticing' as a proxy for pedagogical knowledge is based on the premise that expert and novice teachers perceive classroom events differently (Berliner, 1992), and that noticing effective strategies in others is a precursor to successful application in personal practice (Jamil, Sabol, Hamre & Pianta, 2015; van Es & Sherin, 2002, 2006). The tool is piloted in the context of a wider randomised controlled trial in 117 schools, designed to evaluate an oral language professional development intervention for preschool teachers. Responses from 104 teachers (n=72 schools) are used to explore its psychometric properties.

Findings indicate that the tool provides a reliable measure of pedagogical knowledge, and that scores significantly predict observed quality of practice. Teachers with greater **explicit procedural knowledge**, and those who provided **interpretations** of the interactions they identified, led classrooms with higher-quality language-supporting practice. Teachers who participated in the intervention showed greater procedural knowledge of language-supporting strategies than teachers in the control group. Implications for the understanding and assessment of pedagogical knowledge, and for the design of relevant professional development, are considered.

Impact statement

"The limits of my language are the limits of my world"

(L.Wittgenstein)

The findings of this study have implications for research, policy and practice.

Within the academic domain, the research contributes to conceptual understanding of pedagogical knowledge as a multidimensional construct. The development of a valid and reliable tool for measuring the dynamic pedagogical knowledge of early childhood practitioners also makes an important methodological contribution. Most importantly, it will enable the conduct of much-needed research to determine how workforce development can best foster the pedagogical knowledge needed by teachers to support young children's language development. As Zaslow and Martinez-Beck argue, we currently "*do not have convergent evidence on either the content or the methods in teacher preparation or professional development programs to ensure high-quality early care and education settings for young children"* (Zaslow & Martinez-Beck, 2006). Understanding the development of professional expertise – and the role of knowledge within this - is key to informing the intelligent design of teacher preparation efforts.

As well as supporting future research in the field, the study findings themselves provide practical guidance for the design of teacher qualifications and professional development. Particularly important is the conclusion that explicit knowledge about the 'how' and the 'why' of practice is a stronger predictor of quality than informal procedural knowledge. This has implications for the development of learning opportunities which foster explicit knowledge alongside practice-based experience, and which support teachers and other staff to develop their analytical abilities. In order to most effectively support young children's language development, practitioners need to explicitly understand *which* pedagogical strategies they are using and *why* they are using them. This is an important finding for current debates in the field of intervention design regarding the use of highly scripted interventions versus programmes which foster teacher knowledge and understanding. It also has implications for the support of staff who may largely develop their expertise in the classroom (e.g. teaching assistants, staff working in the non-maintained sector), and

the extent to which we can assume that knowledge grows 'with experience', without being explicitly nurtured and supported.

The study findings are already informing my work as a designer and evaluator of language-focused professional development programmes. In particular, having a deeper understanding of the importance of higher-order and deeply cognitive skills such as analysis and interpretation has broadened my own professional vision.

Finally, since much professional development takes place within schools themselves, the findings have direct implications for practitioners, including teachers and their teams, and for school leaders. The tool itself might also be used as part of professional development, to support teachers and other staff to 'tune in' to oral-language-supporting pedagogy, and support professional discussion.

I plan to actively promote the dissemination of my research findings across all of these domains, through publication in research and practitioner journals, conference presentations and articles in the education and early years press; as well as through my ongoing intervention development and research work.

Reflective statement

The unifying thread of my doctoral studies has been my work as a developer and evaluator of professional development programmes, in both the research and practice contexts.

Until recently, I was a partner in a small company providing professional development to early years practitioners. I am also a researcher at the University of Oxford. At the time I embarked upon my studies, my work focused primarily on the quality of early childhood provision, particularly on the quantitative assessment of pedagogical quality. I had also undertaken a number of studies evaluating the impact of government-funded early childhood programmes. Although worthwhile and - I hope - beneficial, my work was not substantially theory-driven.

One of my primary aims in undertaking a doctorate was to align and 'cross-pollinate' my research and practice worlds. In the domain of research, I regularly assessed the effects of early childhood or professional development programmes on practice and/or child outcomes, but had a limited understanding of the *process* of change and how one might evaluate this. In my practice world, I supported early childhood staff to improve the quality of their practice. The professional development offered by my company was evidence-based in relation to domains of child learning, but did not draw effectively enough on theory and evidence relating to *adult* learning and the ways in which this might best be supported. In both aspects of my work, I felt that I needed to understand more about the mechanisms of change through professional development: the *"dynamic and transactional teaching and learning processes underlying these effects as they function in real-world early childhood settings."* (Sheridan et al., 2009, p.378).

The first year

The early stages of my doctorate, particularly the 'Foundations of Professionalism' module, provided a theoretical grounding in what it means to be a professional. Some of the theorists I referenced in my first assignment – Schön, Eraut and others - continue to guide my thinking today. In this essay, I began the process of reflecting on the professional development which my company offered to early years staff, with reference to theories of professional learning. I was interested particularly in:

- the levels at which change might happen for individual practitioners (e.g. affect, beliefs, knowledge, skill) and how these might relate to changes in practice and/or child outcomes; and
- the mechanisms of change, guided by theories of adult learning.

Through the Methods of Enquiry modules and assignments, I delved further into theory and research on the mechanisms of professional development, and laid the foundations for my Institution-Focused Study. One of theories from this period which has most influenced my thinking is Clarke and Hollingsworth's (2002) inter-connected model of teacher change. This contrasts with models assuming a simple linear progression, whereby professional development leads to personal growth (e.g. in knowledge), which leads to improvements to practice, and so on. Instead, it recognises the complex processes of enactment and reflection through which change in one domain may lead to change in another, and that the pathways may not be straightforwardly linear.

Finally, I carried out a piece of work exploring relationships between *beliefs* about quality, *self-evaluations* of practice, and *observed* quality of practice among early years teachers. With hindsight, I can see that I held rather simplistic view at that stage about how one might assess beliefs, using a rather decontextualised questionnaire method.

The Institution-Focused Study (IFS)

The next phase of study began with a comprehensive review of the literature, solidifying my work and thinking to date, in order to develop a theoretical framework for evaluating professional development. This considered the elements of the 'system' which merit evaluation (e.g. Borko, 2004), potential levels of impact (e.g. Bubb & Earley, 2010; Evans, 2011; Guskey, 2002; Schulman & Schulman, 2007) and a possible order or progression of study. The theories of Desimone (2009), focusing on the effective *characteristics* rather than formats of professional development, were particularly influential. This process served to further deepen my theoretical understanding, and provided a guiding framework for future work.

At the second stage of my IFS research, I applied the framework to the evaluation of a professional development programme provided by my company to a group of 17 schools in Wolverhampton. I developed a self-report questionnaire, based on the

framework, to use with teachers participating in the project. The format, with a mix of open and closed questions, worked well to explore the aspects of the programme which had supported professional growth; and the levers and barriers to change. The interweaving of qualitative and quantitative approaches extended my methodological reach, and my appreciation of mixed methods designs. Less satisfactory was the use of self-report in relation to assessing change in domains such as teacher attitudes, beliefs and knowledge. This observation - and the reflections arising from it - directly informed my final research study, as I became interested in how one might more objectively assess pedagogical knowledge.

A personal challenge during my IFS and beyond was my role as 'insider researcher'. I sometimes found it difficult to project my gaze beyond the evaluation of the professional development programme, and focus on issues of broader relevance to research. Rising to the challenge was worthwhile, however, and both my research and practice have benefitted. As a researcher, evaluating a project in which I was closely involved supported my understanding of the theory and research I had been reading; and applying this theory to a context that I knew intimately allowed me to conduct deeper and more thoughtful research. I also developed a richer awareness of the limitations of measurement in capturing professional practice and the process of change. As a practitioner and intervention developer, my practice benefitted immeasurably from being viewed objectively through the lens of research and theory. Throughout the doctoral process, I was able to act directly on my new knowledge in refining my professional development practice. I also used the findings of my IFS study to strengthen evaluation practices within the company.

The Thesis

For my final study, I focused on one specific aspect of the framework for evaluating professional development: the assessment of growth in knowledge. The study was embedded within a randomised controlled trial in which I was involved as a researcher; designed to evaluate the effects of a professional development intervention for preschool teachers. Data on practice and child outcomes were being collected, but minimal information on the mechanisms of change. My aim was to use the RCT as an opportunity to capture a quantitative measure of pedagogical knowledge, and examine its role as a mediator in improved practice.

My first attempt to assess knowledge at the baseline stage of the RCT involved using a questionnaire which drew on existing surveys. In this, I repeated the mistake I had made in my Methods of Enquiry assignment: the use of a decontextualised method to capture a complex and situated professional construct. A pilot of the questionnaire revealed negligible relationships with quality, and unsatisfactory psychometric properties.

This experience led to further reading, and the realisation that questionnaires cannot hope to capture the complexity of dynamic pedagogical knowledge. Although it had not been my intention at the start, I took on the task of developing and piloting an entirely new tool. My aim - as set out in this thesis - was to develop a video-based measure which would provide a more authentic and situated context for capturing the dynamic pedagogical knowledge which guides real-time decision-making in the classroom.

The experience of developing a new measure has been fascinating and - whilst often challenging - has proved to be an excellent learning experience. The focus on the cognitive facets of knowledge has taken me back to my grounding in psychology, and exercised my theoretical muscles. In relation to the methods, my psychometrics learning curve has been steep but worthwhile.

Today

Reflecting back at the end of the doctoral process, I find myself still occupying the space between research and practice, but in manner which feels more coherent; and I feel better equipped to bridge the two worlds.

Although I still work with the company, I am now taking a more advisory role, which allows me to focus more attention on the academic domain. My intervention development work has thus moved to a more research-focused space, whilst retaining the connection with practice which provides my motivation. I have been able to directly apply my doctoral reading, research and reflections to the professional development programmes I design, putting into practice my new understanding of professional growth, how it happens and how it can best be nurtured.

My research itself has become more theoretical, more focused and - perhaps unsurprisingly - more concentrated on professional development. I feel that I can make

a contribution to quantitative intervention research by applying my new understanding of the mechanism of change. In these days of large-scale RCTs with a focus on child outcomes, the role of researchers who both understand and respect the complexities of pedagogy and professional learning is an important one.

The next steps in my own professional development will be to return to the qualitative sphere in further developing the measure I have created, to ensure that I gather deep and rich data to inform the next iteration.

Acknowledgements

I am immensely grateful to my supervisors, Professor Iram Siraj and Dr. Jake Anders, for their advice, guidance, sanity and humour throughout. I would also like to thank Kathy Sylva, Simon Burr, Charles Hulme, Sarah Coleman, and my four expert reviewers for their wisdom, insight, patience and support. My appreciation also goes to the many schools and teachers who participated in the research.

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Contents

CHAPTER 1: STUDY RATIONALE AND REVIEW OF EXISTING LITERATURE

This chapter sets the scene for the current research, including the study rationale and an exploration of what is currently known. Four sections are included:

- the rationale for studying the pedagogical knowledge of early childhood teachers relating to oral language development;
- a conceptualisation of pedagogical knowledge, and a narrowing of focus to procedural (rather than theoretical) pedagogical knowledge;
- a critical review of existing questionnaire methods for assessing procedural pedagogical knowledge, arguing the need for a more situated means of capturing the dynamic knowledge which guides in-the-moment decision-making, and making the case for a new video-based tool;
- a consideration of the knowledge needed by early educators relating to oral language development, which any new assessment tool should aim to elicit.

1.1 Why study pedagogical knowledge of oral language development?

This introductory section outlines the theoretical and practical rationale for a focus on oral language development and the pedagogical knowledge of early childhood teachers within this domain. It argues that:

1. although early language skills form the foundation of early learning, many children start school without the language skills they need to access the curriculum;
2. high-quality teaching can help these children to catch up with peers;
3. teachers need good pedagogical knowledge to provide high-quality support for children's development;
4. not enough is known about the kinds of knowledge teachers need to support early language skills and how this knowledge can be fostered, to adequately inform the design of teacher qualifications and professional development.

1.1.1 The importance of early language skills

Early language provides a bedrock for later learning. Children's understanding and use of language during the first five years is one of the strongest predictors of later development, particularly literacy (Scarborough, 2001; Lonigan et al., 2008). Language skills at age two predict literacy and behaviour at age five, which in turn predicts achievement into secondary schooling (Morgan, Hillemeier, Hammer & Maczuga, 2015; Duncan et al., 2007).

Children need to develop a range of oral language skills to support their later literacy development. They need, for example:

1. to be able to distinguish sounds within spoken words (**phonological awareness**) so that they can decode and understand printed words (Catts, 1999, Wyse & Goswami, 2013);
2. a broad and deep **vocabulary** - typically-developing children acquire words at a breath-taking rate during their first years, and command an average vocabulary of 1,000 by the age of six (Fenson, Dale, Reznick, Bates, Thal & Pethick, 1994). Word knowledge is the single best predictor of later text comprehension (Stahl & Nagy, 2006; McKeown, Beck, Omanson & Pople, 1985; Ouellette & Beers, 2010), with vocabulary at age six accounting for 30% of the variation in comprehension at age 16 (Cunningham & Stanovich, 1997). It is also implicated in later writing ability (Babayigit, 2015; Duin & Graces, 1987);
3. **morpho-syntactic (grammatical) skills,** which predict their later spelling (Bourassa & Treiman, 2008), reading ability (Nation & Snowling 1998) and writing quality (Northey, McCutchen & Sanders, 2016);
4. oral **narrative** abilities, which predict their later literacy and other skills (O'Neill, Pearce & Pick, 2004; Snow, Porche, Tabors & Harris, 2007).

Children also need firm understanding of **pragmatics** to support them in social communication with others (Matthews, 2014).

This study focuses on those aspects of oral language development which relate to comprehension (i.e. making and taking meaning from language). While phonological awareness predicts later decoding abilities, oral language comprehension skills (such

as vocabulary knowledge and grammatical, morphological and pragmatic skills) are critical for developing later reading comprehension (Hulme & Snowling, 2014).

Early language skills also support children's broader cognitive trajectories - including conceptual development, theory of mind, episodic memory development and working memory (Goswami, 2015). They are intimately related to social, emotional and behavioural development, and predict, for example, children's relationships with adults and peers, self-esteem and the likelihood of being bullied (Save the Children, 2015. As a result, the consequences of delays in early language development are far-reaching.

Given the fundamental importance of early language, the fact that children enter school with widely differing experiences and skills is a great concern to researchers, practitioners and policy-makers. In England, a quarter of children fall below the expected level of language development at age five, and the number with identified speech, language and communication needs increased by 72% between 2005 and 2011 (Save the Children, 2015). Children growing up in disadvantage are at particular risk of delay (Law et al. 2017). The gap between disadvantaged children and their peers emerges before school-age (Waldfogel & Washbrook, 2011) and has been identified in relation to vocabulary (Farkas & Beron, 2004; Lee & Burkam, 2002; Waldfogel & Washbrook, 2010), linguistic productivity and syntactical complexity (Arriaga et al 1998; Snow 1998), and narrative skills (Peterson, 1994). By age five, the word knowledge of children from low-income families is, on average, 16 months behind that of children from the most advantaged families (Waldfogel & Washbrook, 2010); and once children have fallen behind, they are unlikely to catch up without additional support (Save the Children, 2015; Stanovich, 1986). However, early language and literacy intervention can help to mitigate the effects of early developmental delay, with benefits for children's long-term life chances (Dickinson, Golinkoff & Hirsh-Pasek, 2010; Justice, Mashburn, Pence, & Wiggins, 2008; Nutbrown, Hannon & Morgan, 2005). Creating early childhood environments which foster language learning is, therefore, of paramount importance.

1.1.2 Promoting early language through high-quality early education

The provision of high-quality preschool experiences is a primary means of early intervention, which can help disadvantaged children to catch up with their peers (Sylva, Melhuish, Sammons, Siraj & Taggart, 2010). Ensuring that preschool teachers

are equipped to support young children's language development, therefore, is essential to combat early disadvantage. Yet investigations of early childhood classrooms suggest that current practice falls short, with limited support for children's developing language skills (Cabell, DeCoster, LoCasale-Crouch, Hamre & Pianta, 2013; Cunningham, Zibulsky, & Callahan, 2009).

To improve the quality of support for oral language skills in early childhood classrooms, it is important to understand whether (and how well) the current efforts to improve practice are working - so that refinements can be made. Although teacher qualifications and in-service professional development are widely recognised as important, associations with practice and child outcomes have, to date, required a high degree of inference (Strickland, Snow, Griffin & Burns, 2002). As Zaslow and Martinez-Beck argue, *"we simply do not have convergent evidence on either the content or the methods in teacher preparation or professional development programs to ensure high-quality early care and education settings for young children"* (Zaslow & Martinez-Beck, 2006).

Understanding the process of change is key to informing the intelligent design of teacher preparation efforts. In particular, it is important to understand the *"dynamic and transactional teacher and learning processes underlying effects"* (Sheridan, Edwards, Marcin & Knoche, 2009), including the educator characteristics which predict good practice and child outcomes, and how these can be shaped through teacher professional development.

1.1.3 The role of pedagogical knowledge in ensuring high quality teaching

It is an implicit assumption in many practitioner education programmes that teacher knowledge is important and should be improved. Knowledge is understood to be theoretically important, and to play a role in ensuring teaching quality and positive child outcomes (Shulman, 1987; Grossman, 1990; Ben-Peretz, 2011; Putnam & Borko, 2000). Teachers are understood to need knowledge both to inform their teaching of *content* and their *pedagogy* (Cunningham, Zibulsky, & Callahan, 2009; Moats, 2009; Lampert, 2001). Content knowledge reflects the subject-specific matter to be taught (the '*what*'), while pedagogical knowledge reflects the ways in which content is represented for learners (the '*how*') (Shulman, 1986, 1987).

Considering content knowledge first, preschool teachers need a grasp of basic language constructs such as phonology, vocabulary, morphology, syntax and narrative. They need to understand how language works because "*one cannot be expected to give what one does not possess*" (Applegate & Applegate, 2004; cited in Binks-Cantrell et al., 2012). There is good evidence that, for example, primary school teachers' reading-related content knowledge is important for practice quality and child outcomes (Moats & Foorman, 2003; McCutchen et al., 2002; McCutchen, Green, & Abbott, 2009). Studies relating to oral language in the preschool and early primary context are less common, but have identified effects on, for example, the amount of language and literacy instruction provided (Schachter, Spear, Piasta, Justice & Logan, 2016) and outcomes such as word reading (Piasta, Connor, Fishman & Morrison., 2009). One recent, and rare, study relating to comprehension-related aspects identified an effect of content knowledge about semantics, pragmatics and narrative on children's gains in expressive vocabulary over the kindergarten year (Cash, Cabell, Hamre, DeCoster & Pianta, 2015). Piasta and colleagues offer evidence that teaching can even be counterproductive where practitioners do not have the requisite content knowledge. In their study of first-grade classrooms, children's word-reading outcomes improved when more knowledgeable teachers spent more time in decoding instruction; but children did *less* well when the least knowledgeable teachers increased their focus on decoding. This was so despite use of a prescriptive language and literacy curriculum, suggesting that the curriculum alone could not provide an adequate substitute for teacher knowledge and expertise (Piasta et al., 2009).

It is clear that content knowledge matters. Theory and intuition tell us that practitioners also need to know how to *apply* their content knowledge in practice to support learning and development (Cordingley et al., 2015; Merriman, 2015; Shulman, 1986, 1987). However, little research exists to illustrate the importance of such pedagogical knowledge for early language development. Much is inferred; for example, in professional development studies which claim a focus on improving knowledge, and have subsequently identified an effect on practice (Dickinson & Caswell, 2007; Neuman, 1999; Wasik, Bond & Hindman, 2006; Jackson et al., 2006). While studies of middle and secondary maths and science educators show that subject-specific pedagogical knowledge matters (Baumert et al., 2010; Ball, Thames, & Phelps, 2008; Hill et al. 2008; Pflanzl, Thomas, & Matischek-Jauk, 2013), equivalent

studies for early childhood and/or language development are rare, and findings equivocal.

Carlisle and colleagues assessed the pedagogical knowledge of early primary teachers relating to the oral language and literacy practices that occur in teaching word reading and comprehension, and identified only small effects for first grade reading comprehension, with no effects in later grades (Carlisle, Kelcey, Rowan & Phelps, 2011). No effects were found for children's word analysis skills. Schachter and colleagues found no associations between language- and literacy-related pedagogical knowledge and the amount of time spent by early childhood educators in language- and literacy-related instruction (although an effect was found for content knowledge) (Schachter et al., 2016).

While quality rather than quantity of instruction is arguably a more appropriate outcome measure, the handful of studies which have included quality measures - largely randomised controlled trials (RCTs) of professional development interventions - have also failed to reveal convincing effects. While some found pedagogical knowledge to be sensitive to intervention (Hamre et al., 2012; Garet et al., 2008; Hindman & Wasik, 2011; Ottley at al., 2015), others found no change, despite improvements in the quality of practice (Neuman & Cunningham, 2009). A recent meta-analysis by Markussen Brown and colleagues (2017), summarising the effects of multiple trials evaluating language- and literacy-focused professional development, found no significant effect for practitioner knowledge.[1] Even where RCTs have identified improvements for both pedagogical knowledge and practice, there is little evidence that knowledge mediates change in practice (e.g. Hamre et al., 2012). Only one small-scale evaluation of the EXCell language intervention (n=27) identified a trend for knowledge at post-test to predict global quality of practice: however, effects were seen only in relation to literacy-related knowledge, with no change for oral language items (Hindman & Wasik, 2011).

This is puzzling, given the theoretical importance of pedagogical knowledge, and the considerable efforts invested in improving it. More work is needed to understand what preschool teachers need to know to nurture young children's language development,

[1] The review did not distinguish between types of knowledge, and the studies included varied in their focus, with some addressing content and some addressing pedagogical knowledge.

and how this can best be improved. Without this understanding, developers of teacher qualification and professional development programmes are, to some degree, 'designing in the dark'. As Markussen Brown and colleagues (2017) assert, *"the current treatment of educator knowledge is incomplete and requires future work to expand our understanding of what knowledge is valuable to have as an educator in terms of outcomes, and how it can be obtained via professional development."* The current study aims to fill this gap, focusing specifically on the pedagogical content knowledge of early childhood teachers relating to oral language development, in domains related to language comprehension.

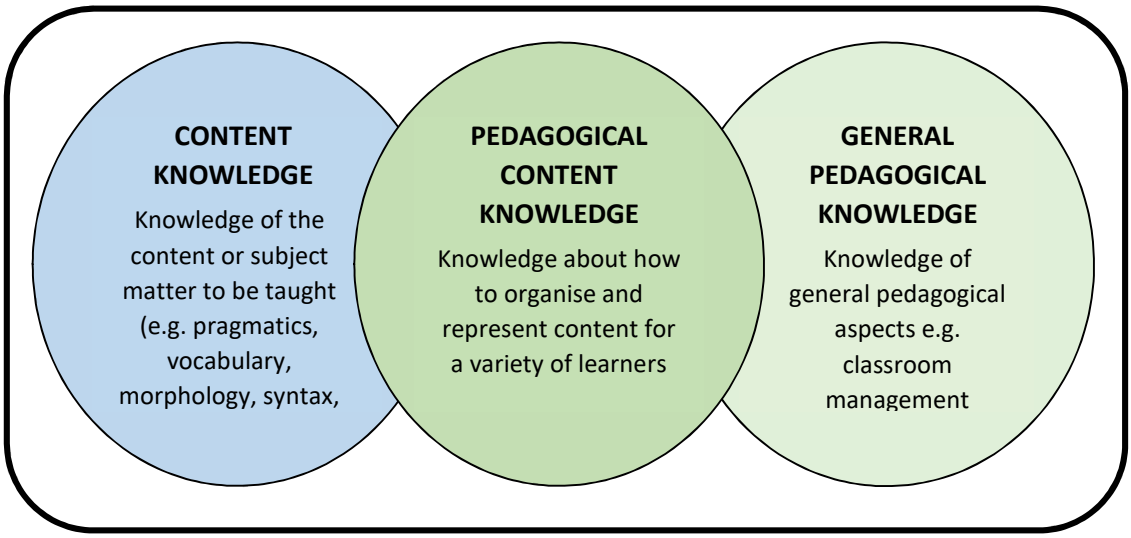
1.2 Conceptualising pedagogical knowledge

Before considering how gaps in understanding might be addressed, it is important to reflect on the precise meaning of pedagogical knowledge. The following section considers the concept's theoretical underpinnings, and identifies procedural (rather than theoretical) pedagogical knowledge as the specific focus for this research.

1.2.1 The relationships between content and pedagogy

Teaching is a complex endeavour, involving responsive decision-making in dynamic and flexible contexts (Leinhardt & Greeno, 1986). To support their craft, teachers need "*flexible access to rich, well-organised and integrated knowledge from different domains"* (Koehler & Mishra, 2009, p. 1020). Shulman's seminal papers identified multiple facets of teacher knowledge, including understandings of content, pedagogy, curriculum, learners, educational contexts, and the purpose, value and philosophy of education (Shulman, 1986, 1987). Research and theory post-Schulman have focused largely on *content knowledge* of the subject-specific matter to be taught (the 'what'), and on *pedagogical knowledge* (the 'how'). Pedagogical knowledge can be divided further into domain-specific knowledge of how to represent content for learners (pedagogical content knowledge) and *general* pedagogical knowledge - which reflects the broad principles and strategies of classroom management and organisation that transcend subject matter (Schulman, 1986, 1987). Figure 1.1 shows these different facets, and the relationships between them.

Figure 1.1 The relationships between content and pedagogical knowledge



Studies of middle- and secondary- educators show that these three facets can be empirically distinguished, with the two domains of pedagogical knowledge (i.e. content and general) being more strongly associated with each other than with content knowledge (Baumert et al., 2010; Voss et al., 2011; König et al., 2016). Other theorists consider content knowledge to represent one facet of pedagogical content knowledge (Rowan et al., 2001; Hill, Rowan & Ball, 2005).

For the purposes of this research, language-related pedagogical content knowledge is understood to be related to, but distinct from, language-related content knowledge. For example, a teacher with good *content* knowledge may know how to form the past tense of irregular verbs (e.g. I run -> I ran) and understand that children need to develop this skill. If she also has good *pedagogical content* knowledge, she may understand that children often overgeneralise regular endings before mastering irregular forms, know that recasting is a technique which can support grammatical development, and be able to *use* recasting appropriately when needed (e.g. "I runned fast" -> "You ran fast!").

1.2.2 *Pedagogical content knowledge (a focus on the procedural)*

Pedagogical content knowledge provides a bridge between content and learners, and was described by Schulman as, *"the capacity of a teacher to transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students"*

(Schulman, 1987, p.15). While the construct has been defined in different ways (Mishra & Koehler, 2006, Shulman, 1986, 1987; Neuman & Cunningham, 2009; Snow, Griffin & Burns, 2005), it broadly includes knowledge of learners and learning, knowledge of how to organise and represent content for learners, and knowledge of how to adapt teaching for specific contexts and learners.

Unpacking this construct further, it is possible to distinguish between theoretical knowledge *('knowing that'*) and procedural knowledge *('knowing how'*), both of which are important for expert classroom practice (Anderson & Krathwohl, 2001; Bromme, 2001; Hindman & Wasik, 2011). **Theoretical** pedagogical knowledge, also described as declarative, factual, epistemic or conceptual knowledge, is static and generalisable - applicable to a wide variety of situations (Hindman & Wasik, 2011; Korthagen & Kessels, 1999). In relation to oral language development, it might include knowledge of the typical stages of development, common misconceptions or difficulties, or the pedagogical techniques known to support children's language development.

In contrast, **procedural** pedagogical knowledge is highly situated, and shapes teaching and teaching decisions within specific classroom situations (Alonzo & Kim, 2018). Such knowledge informs teachers' judgements and actions, enabling them to apply and adapt strategies for different contexts and children to maximise learning and development (Schulman, 1987; Abell, 2008). Procedural pedagogical knowledge might involve knowing how to evaluate a child's language ability within a specific context, knowing what is needed to move the child's learning on, and knowing how to enact appropriate pedagogical techniques to achieve this, adapting as required in response to the child. *Dynamic* procedural knowledge guides in-the-moment action, while *reflective* knowledge informs the planning of teaching, and reflection and evaluation post-teaching (Knievel, Lindmeier & Heinze, 2015). This study focuses on dynamic procedural knowledge.

Teachers need both theoretical and procedural knowledge to be effective (Bromme, 2001). While theoretical knowledge can be gained through study, procedural knowledge develops through the application and refinement of teaching strategies in real classroom contexts (Brouwer & Korthagen, 2005; Lee & Luft, 2008). It is actively generated through practising the craft of teaching within the classroom (Cochran-Smith & Lytle, 1999, p. 250). Parallels can be drawn to the theories of Eraut (1994),

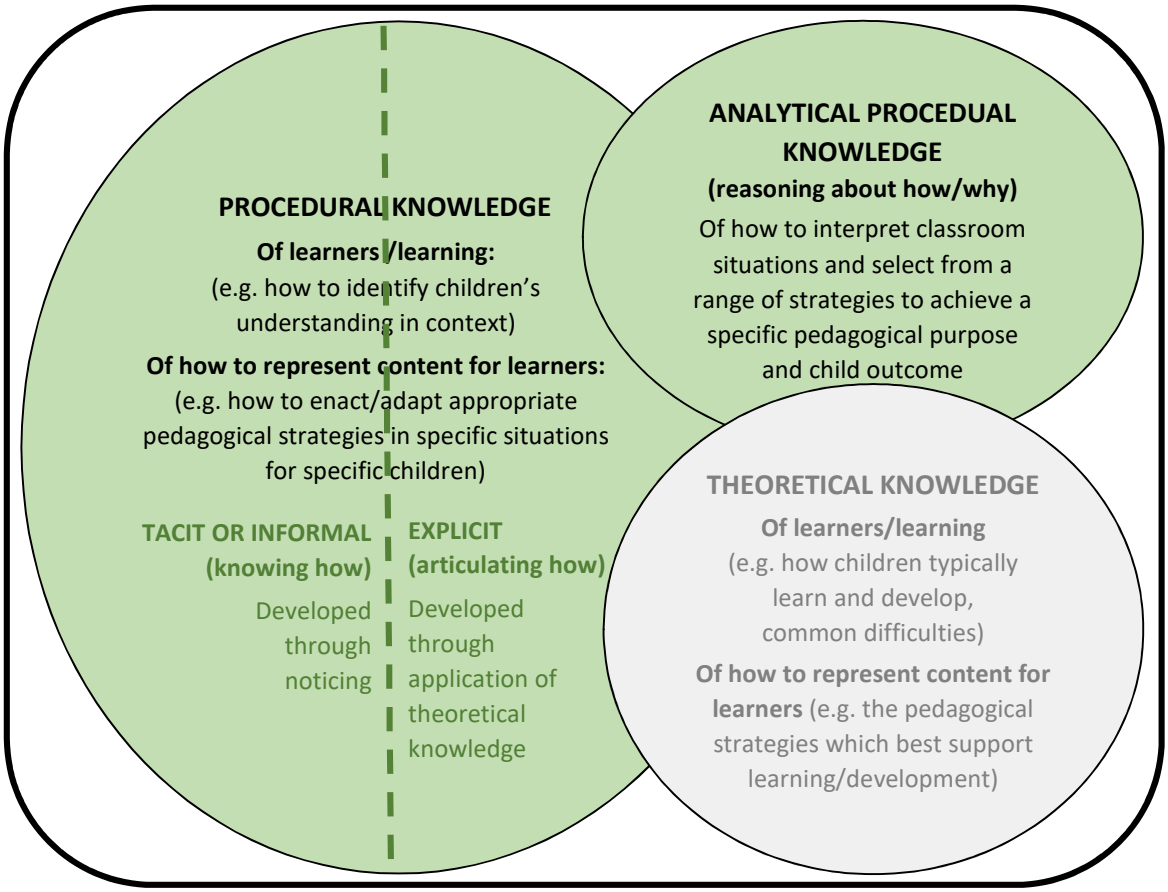
who emphasised the integration of theory and practice, and the learning which arises through experience. Some theorists argue that theoretical and procedural knowledge can develop independently; that is, procedural pedagogical knowledge can develop without passing through a declarative stage. This is understood to happen through 'noticing' (van Es & Sherin, 2002, 2006); that is, teachers attend to, and internalise, observations of their own (and other teachers') actions, and the consequences of those actions for children, and adapt their practice gradually as a result. Such tacit procedural knowledge may be difficult for teachers to articulate: as Dienes and Berry (1997) note, people learn about the structure of a complex system *"without necessarily intending to do so, and in such a way that the resulting knowledge is difficult to express".*

In contrast, traditional information processing models assume that the theoretical is transformed into the procedural via processing practice, to become explicit procedural knowledge (Schneider & Shiffrin, 1977). In this conception, procedural knowledge mediates the relationship between theoretical knowledge and classroom practice (Alonzo and Kim, 2018; Anderson, 1982). Indeed, some argue that procedural understanding represents skill rather than knowledge: the flexible *application* of theoretical knowledge to practice (Alonzo & Kim, 2018). Both pathways may be possible. However, the transformation of the declarative into the procedural is understood to involve deeper processing than tacit procedural knowledge development. While the mechanism may still be 'noticing', such perceptions are likely to be more targeted, richer and deeper because they are guided by explicit knowledge. Only such explicit procedural knowledge is believed to support reasoned and intentional practice (Kelchtermans, 2004).

This ability to reason about classroom events, and about the teaching process, is the final facet of dynamic pedagogical knowledge (Seidel & Stürmer, 2014; van Es & Sherin, 2002). Pedagogical reasoning involves yet deeper transformation, drawing on explicit professional knowledge and connecting it with contextual information, in order to analyse the 'how and why' of pedagogical practice (Kelchtermans, 2004). Such analytical knowledge further supports intentional teaching: deliberate selection from a range of alternative teaching strategies, in order to achieve a specific pedagogical purpose and child outcome.

The three cognitive facets of procedural pedagogical knowledge to be explored in this study are shown in Figure 1.2 below, alongside theoretical pedagogical knowledge. Together, these form 'professional vision': the ability to perceive what is happening within the classroom, and to make professional sense of it (Stürmer, Seidel & Schäfer, 2013; Sherin, 2001; Cochran-Smith & Zeichner, 2005; Darling-Hammond, 2010).

Figure 1.2. The cognitive facets of domain-specific pedagogical knowledge ('professional vision')



1.3 A critical look at existing methods for assessing procedural knowledge: the case for a new video-based tool

Given the clear theoretical and practical rationale for the importance of pedagogical knowledge, how can the lack of evidence linking oral-language-related knowledge to improved practice and child outcomes be explained? One plausible hypothesis is that methodological failings underlie the null results (Markussen Brown et al., 2017; Schachter et al., 2016). Carlisle and colleagues (2011) highlight the inadequacy of available assessments, noting the lack of detailed information about the domains of knowledge addressed, theoretical provenance of questions, and psychometric

properties of measures. Few assessments have been developed using experimental or quasi-experimental designs which control for external variables.

1.3.1 The pitfalls of questionnaire methods

A review of pedagogical content knowledge measures indicates that questionnaire assessments have, until recently, formed the dominating method (Baumert et al., 2010; Hill et al., 2008; König & Seifert, 2012; Tatto et al., 2012), with frequent use of multiple-choice assessments. Questionnaires enable reliable, efficient and standardisable data collection across large samples. They provide an appropriate method for capturing static theoretical knowledge, which is explicit - and can thus be articulated and assessed via recall. This is evidenced by the fact that questionnaires have been used successfully to measure oral language-related content knowledge in a manner which predicts practice and child outcomes (Cash et al., 2015, Schachter et al., 2016; Piasta, Connor, Fishman & Morrison, 2009). They have also been used successfully to capture *theoretical* pedagogical knowledge in teachers of older children (Lohse-Bossenz, Kunina-Habenicht, Dicke, Leutner & Kunter, 2015). However, surveys - particularly multiple choice formats - may be inadequate to capture inherently dynamic and context-dependent constructs such as *procedural* pedagogical knowledge (Schachter et al, 2016). An analysis of methods reveals that all the previously-cited studies with minimal effects for language and literacy-related pedagogical knowledge employed questionnaires (Carlisle et al., 2011; Hamre et al., 2012; Hindman & Wasik, 2011; Neuman & Cunningham, 2009; Ottley at al., 2015; Schachter et al, 2016).

Although questionnaire designers have attempted to recreate hypothetical classroom scenarios, these remain far removed from both the complexity and heterogeneity of real classroom contexts, and from the contextualised nature of teacher's real-time decision-making (Alonzo & Kim, 2016). For example, the Teacher Knowledge Assessment of Early Language and Literacy Development measure (Neuman & Cunningham, 2009) contains the following procedural question:

> *Which of the following is the <u>most</u> effective way to encourage young children to go to a cosy corner book area more often during free choice time?*
>
> a. *Reward children who choose to go to the area during free choice time.*
> b. *Structure 20 minutes of independent reading time each morning.*
> c. *Create an attractive area with open faced bookshelves.*

d. *Provide at least 50-100 books in the area.*

Although one could make a case for a 'right answer' (option c) based on theory, an expert teacher would likely use their dynamic procedural knowledge flexibly to make in-the-moment decisions appropriate for the context and children involved, and adapt their practice based on children's responses (Ball & Bass, 2000; Cochran-Smith & Lytle, 1999; Kersting, 2008). For example, she may choose to reward a child who uses the book area independently for the first time and, when completing the multiple-choice item above, select option 'a' on the basis of this reasoning. Alternatively, she may choose the theoretically assumed 'correct' option for reasons which differ from the knowledge-state which this choice is assumed to represent (Smith & Banilower, 2006). The knowledge which supports real-time classroom decision-making is complex and highly topic-, person- and situation-specific (Abell, 2008; Kind, 2009; Van Driel & Berry, 2010) and, as such, is unsuited to decontextualised questionnaire methods.

The second consideration, when attempting to capture pedagogical knowledge, is the extent to which assessment methods require teachers to articulate knowledge that may have developed tacitly through noticing (Alonzo & Kim, 2016). If procedural knowledge is implicit rather than explicit, it may be impossible to elicit using survey-based questions which rely on the recall and articulation of information. It may take richer methods to capture "*deep knowledge of subject matter and actual teaching skills''* (Darling-Hammond & Baratz-Snowden, 2005, p. 61).

It is clear that gaining further insights into pedagogical content knowledge, particularly dynamic procedural knowledge, requires better methods for making it visible - and thus measureable. Although progress has been made in defining and capturing certain aspects of teacher knowledge *"the knowledge that is required to make real-time instructional decisions to support students with different learning goals in the same classroom, have yet to be operationalized for assessment purposes"* (Kersting, 2008, p.846).

1.3.2 Going beyond multiple-choice: using video assessment to elicit procedural knowledge

Given the shortcomings of multiple-choice questionnaires, how can alternatives be identified which better reflect the complexity of classrooms and the contextual nature of procedural knowledge, and which enable tacit knowledge to be expressed? A survey of studies focusing on science and mathematics subject teachers (by far the largest body of research in this area) reveals a variety of methods, and Alonzo & Kim (2016) provide a helpful framework for evaluating these. At the most contextualised and individualised end of the spectrum, approaches include the assessment of teachers' knowledge-in-action by assessing their actual practice (e.g. Parks et al., 2011), or by asking teachers to articulate or analyse their decision-making following a real teaching interaction - either via an interview, discussion group or structured template (Lee & Luft, 2008; Loughran et al., 2004; Gess-Newsome et al., 2011) or by analysing a video of their own practice (Kanter & Konstantopoulos, 2010; Roth et al., 2011). Whilst such methods offer highly situated contexts for assessing procedural knowledge, they are resource-intensive, difficult to standardise, and require considerable coder inference, with associated risks of attribution error (Kennedy, 2010, pp. 592–593).

At the other end of the spectrum are studies which create *hypothetical* contexts to elicit responses. These include the formats already critiqued, which present an artificial instructional situation, offer a range of pedagogical responses and - rather simplistically - assume a 'correct' answer. Other researchers have been more creative in their attempts to overcome the constraints of questionnaire assessment. For example, as part of a study exploring the general pedagogical knowledge of mathematics teachers, König and colleagues asked teachers to generate potential strategies or solutions in response to written vignettes (e.g. the questions they might ask to help a future teacher evaluate her lesson) (König et al., 2011). Others have provided vignettes describing classroom situations, and asked teachers to identify or analyse the instructional strategies being used (e.g. Cohen & Yarden, 2009; Veal, Tippins & Bell, 1999). Such methods go beyond simple multiple-choice formats in providing contextual detail, and may provide a reasonable approximation of a teaching context for some forms of procedural knowledge. For example, Rowan and colleagues (2001) developed and piloted a pedagogical content measure addressing literacy and

maths knowledge in primary school teachers. The sample question provided offers an extract from a book passage, and a hypothetical transcript of a child reading the passage aloud. Teachers are then asked to rate their agreement with a series of statements about the child's reading on a 4-point scale (e.g. *'Linda is proficient at reading words with a consonant blend'*). This situation credibly reflects the classroom context, and teachers' possible experience of assessing children's abilities. However, the method is, arguably, less suited to capturing the procedural knowledge which might underpin a teacher's decision-making about how best to support Linda's learning in a real classroom context. In this context, a written scenario would provide an 'artificially neat' approximation of real decision-making (Kagan, 1990).

Finally, between these extremes of the actual and the hypothetical, lies an emerging seam of studies which present teachers with examples of real situations involving practitioners and/or children, and ask them to identify or analyse pedagogical strategies and decision-making, or children's responses and thinking. This is often achieved through video analysis (e.g. Goldman, Pea, Barron & Denny, 2007; Kersting, 2008; Roth et al., 2011), but has also involved the interpretation of students' written work (e.g. Drechsler & van Driel, 2008). This is a promising methodology, since it preserves the complexity of the classroom context and offers authentically rich situations, whilst retaining the possibility of standardised administration across contexts (Sherin, Linsenmeier & van Es, 2009). It may also, depending on how responses are prompted, allow tacit procedural knowledge to be elicited. The use of video to elicit pedagogical knowledge is supported by evidence that noticing effective strategies in others is a precursor to successful application in personal practice (Jamil et al., 2015; van Es & Sherin, 2002, 2006). It also builds on theory and research suggesting that experts and novices organise, store and access their knowledge in different ways (Berliner, 1994; Bransford, Brown, & Cocking, 2000) - and that, as a result, they perceive classroom events differently (Berliner, 1992).

The current research extends this work - conducted almost solely with middle and secondary education subject teachers - to the assessment of procedural pedagogical knowledge about early language development. To date, only one known attempt has been made to use video assessment with early childhood practitioners. The Video Assessment of Interactions and Learning (VAIL, Wiens et al., 2013; Jamil et al., 2015)

considers procedural pedagogical knowledge in a range of domains, defined by the CLASS rating scale (Pianta, La Paro & Hamre, 2008), and including quality of feedback, instructional learning formats and regard for student perspectives. Early results are promising: the VAIL has been shown to predict quality of instructional practice (Jamil et al., 2015), and there is tentative evidence of a mediating role in the improvement of quality (Hamre et al., 2012). However, while adding to the evidence-base on procedural pedagogical knowledge, this work cannot provide detailed information to guide professional development relating to oral language development. Although some versions of the VAIL include language-and-literacy items, the focus of the vignettes is on early literacy and code-related aspects rather than oral language development. In addition, the domains addressed by the CLASS rating scale upon which the VAIL is based - while evidence-based - do not provide a fine-grained view of pedagogical practice in relation to oral language development.[2]

The current study takes a subject-specific approach to extending the broad focus of the VAIL, and aims to develop a video-based assessment tool to capture knowledge relating to early childhood oral language development. It also draws inspiration from the range of cognitive knowledge facets addressed by existing studies of secondary education teachers (e.g. procedural knowledge, analytical knowledge), to consider these for the first time with early childhood educators. In order to inform the scope of the new assessment, the following section considers the facets of knowledge needed by early educators, which any new assessment tool should aim to elicit.

1.4 The facets of dynamic procedural knowledge

1.4.1 Cognitive facets

Since teacher expertise lies in the way that knowledge is codified to allow retrieval (Berliner, 2001), it is important to clarify which cognitive facet of teacher competence is to be examined (König, Blömeke, Klein, Busse & Kaiser, 2014). Which facets do teachers need at their disposal, and what might provide an indication of higher knowledge? This section considers the cognitive dimensions of dynamic procedural pedagogical knowledge, and how these might be elicited through video vignettes. It does this by drawing from theories of cognitive processing, 'professional vision' and

[2] There are six items in the CLASS 'Language Modelling' subscale: frequent conversation, open-ended questions, repetition and expansion, self and parallel talk, and advanced language modelling.

'noticing' (Goodwin, 1994; van Es & Sherin, 2002; Seidel et al., 2013), and from work on teacher expertise (e.g. Berliner, 1992).

As noted, professional vision reflects the ability to perceive what is happening within the classroom, and to make professional sense of it (Stürmer, Seidel & Schäfer, 2013; Sherin, 2001; Cochran-Smith & Zeichner, 2005; Darling-Hammond, 2010; König et al., 2014). Although definitions vary, most theorists distinguish between perceptual noticing and the more complex and integrated abilities of 'interpreting' or 'reasoning' about classroom situations, while acknowledging that these may be intimately connected and interdependent in practice.

Video-based assessment depends on the further premise that experts and novices notice different things when making observations (Feldon, 2007), and are better equipped to analyse problems and situations (Glaser & Chi, 1988). These abilities are thought to stem from the way expert knowledge is organised and codified in long-term memory, to allow efficient retrieval for use (Bromme, 2001). Expert knowledge is understood to be structured within interconnected scripts and schemata, enabling them to chunk information rather than considering each element separately, which in turn allows them to assimilate and understand new information and situations quickly and comprehensively, and to analyse potential outcomes efficiently (Dehoney, 1995; Miller, 2011; Gruber & Renkl, 2000; Kirschner, Sweller & Clark, 2006). The following sections consider noticing and interpreting in turn, the ways these might be elicited using video vignettes, and the differences which might be anticipated between expert and novice teachers.

Noticing and Knowing How (procedural knowledge)

Noticing describes whether teachers attend to events which are important for teaching and learning in classrooms (Seidel & Stürmer, 2014; van Es & Sherin, 2002), and can filter out what is not important. As noted, due to the ways in which their knowledge is codified, experts are better equipped to notice salient moments, to notice more accurately and with greater detail (Berliner, 1986, 1992; Klein & Hoffman,1993; König & Lebens, 2012; Sabers, Cushing, & Berliner, 1991) and to notice more holistically (Bromme, 2001). This 'expert noticing' can serve as a proxy for procedural pedagogical knowledge (Kersting, 2008).

It is important to distinguish between noticing as a *mechanism* for developing procedural pedagogical knowledge in the classroom, and using teacher's abilities to notice in response to video vignettes as a means of tapping into their pedagogical knowledge. This study takes the approach of Kersting (2008) and others in assuming that noticing can provide means of eliciting and assessing underlying procedural knowledge. Teachers' ability to '*notice how*' provides a window into their ability to '*know how*' to enact specific strategies within specific classroom contexts. This approach assumes that, in order for teachers to detect and identify an effective interaction, they must have a cognitive schema to represent this interaction (Jamil et al., 2015). Others consider the skill of noticing effective practice to be an important precursor to the application of these effective practices in the classroom, and to depend heavily on knowledge, but not to *represent* knowledge in itself (e.g. Jamil et al., 2015; König et al., 2014).

Studies have used different methods to prompt teacher noticing in response to video vignettes. The TED-M study (König et al., 2014) used closed-response Likert-type questions which were then scored against a correct answer (e.g. "*most students take an active part in the lesson*"). The TEDS-M measure has been shown to be psychometrically sound, but has not yet been validated against practice or child outcomes. Others (e.g. Voss et al., 2011; Jamil et al., 2015) have taken a more open approach and asked teachers to describe the interactions they see within vignettes.

The VAIL, for example, asks teachers to describe the strategies they observe which would support specific outcomes (e.g. engaging students, providing quality feedback), and to provide a behavioural example of each (Jamil et al., 2015). Responses are coded using a rubric based on the CLASS rating scale according to four indicators: the *number* of CLASS-matched pedagogical strategies identified; the *breadth* of strategies identified; the number of correct behavioura*l examples* (reflecting the ability to focus on specific effective behaviours); and the number of times the example matched the strategy identified (reflecting precision of noticing). Dimensionality assessment indicates that these four elements are best described by a single unified model of 'teacher noticing', reflecting both the existence of teachers' schemata for effective interactions and their skill in detecting those interactions.

Early results are promising: the total VAIL score predicted observed quality of instructional practice (Jamil et al., 2015), and there is tentative evidence of a mediating role for breadth of noticing in the improvement of quality (Hamre et al., 2012). The open-response format would seem to match the real classroom context more closely than forced-response, since it allows identification of what teachers attend to in a complex situation; although, from the description available, it does not appear that (other than needing to match a CLASS strategy) the VAIL assesses the extent to which teachers attend to the most *salient* aspects of an interaction.

As described, video vignettes are thought to provide a more effective means than questionnaires of eliciting tacit procedural knowledge. Certainly, they are closer to real classroom situations. However, in order to provide responses in all the video studies cited above, teachers need either to be able to articulate (i.e. describe) the strategies they notice, or to tap into their explicit knowledge for answering multiple-choice questions. The extent that video assessment genuinely elicits tacit knowledge remains an open question.

A fruitful line of exploration might be to attempt to distinguish - at a minimum - between formal and informal procedural knowledge. While much attention has been paid to formal and informal *learning opportunities*, as represented by formal qualifications and by teaching experience respectively (e.g. Richter, Kunter, Klusmann, Lüdtke & Baumert, 2011), there has been less discussion of possible differences between the formal and informal *knowledge* which might arise from such experiences. An indicator of formal explicit knowledge derived through teacher qualification or professional development might be, for example, the use of specialist terms in describing strategies (e.g. 'open questions'). In contrast, a practitioner who had developed their knowledge through experience - whether tacitly or explicitly - might refer to open questions as 'how' or 'why' questions. A fuller exploration and comparison of formal and informal knowledge would extend the field in relation to understandings of procedural competence.

Reasoning About How and Why (analytical procedural knowledge)

The second significant facet of dynamic procedural knowledge involves the ability to *reason* about classroom events and interactions (van Es & Sherin, 2002; Seidel & Sturmer, 2014). The interpretation of events goes beyond generating mental

representations, since it depends on reframing and transforming knowledge. Although teachers rarely articulate their interpretations in the classroom, since analysis involves making connections to explicit knowledge, it is reasonable to assume that interpretations can be elicited using video vignettes, in order to assess knowledge.

While conceptions differ, theory and research suggest that expert teachers are better equipped to reason about the potential purpose behind teaching interactions, to predict or reason about children's thinking/outcomes, and to make decisions based on their reasoning - including generating possible alternative approaches (Berliner, 1992; Bromme, 2001; König & Lebens, 2012; Leinhardt & Greeno, 1986; Sabers, Cushing, & Berliner, 1991; Seidel & Sturmer, 2014; van Es & Sherin, 2002). This is understood to be due to the deeper and more interconnected quality of their codified knowledge, and the ease with which they can use it flexibly to comprehend and reason about new situations, link it with existing knowledge, and anticipate possible alternative outcomes (König et al., 2014; Putnam & Borko, 2000). For example, while pre-service teachers can *describe* interactions, their reasoning is not as highly developed as in-service teachers (Oser, Heinzer, & Salzmann, 2010; Seidel & Prenzel, 2007).

Existing video assessment studies have used a range of techniques to elicit interpretations, with a mix of closed- and open-response formats. For example, Kersting (2008) showed participants ten vignettes representing different mathematical teaching interactions, and asked them to analyse how the teacher and student related to each other, and to the mathematical content. Responses were credited for reference to central elements of the teaching and learning process (i.e. students, content, pedagogy), and awarded an overall score reflecting the *degree* of analysis. Others have asked teachers to respond to vignettes by suggesting pedagogical responses or alternative strategies as if they were teaching, on the basis that generating information and/or decision-making form a specific cognitive facet of pedagogical knowledge (Anderson & Krathwohl, 2001; Kaiser et al, 2015; Knievel et al., 2015; Voss, Kunter & Baumert, 2011; Shavelson & Stern, 1981). Taking an authentic but hard-to-standardise approach, Vogt & Rogalla (2009) asked teachers to halt videos when they recognised a non-adaptive teacher response, explain their reasoning and suggest an alternative approach. At the more standardised end, Seidel and Stürmer

(2014) used Likert-type items to prompt responses to vignettes of mathematics teaching, eliciting descriptions (i.e. noticing), explanations and predictions.

Whilst interpretation appears to be theoretically important - and many of these recent measures have credible psychometric properties - few have been validated against practice or child outcomes. One recent study of mathematics teachers (Kersting, Givvin, Sotelo & Stigler, 2010) identified a relationship between interpretations (specifically, generating alternative teaching strategies) and student learning.

To conclude, it is clear that professional vision (i.e. pedagogical content knowledge) is a multidimensional construct. Previous studies indicate a three-factor model, comprising theoretical knowledge, noticing and interpreting (König et al., 2014), with theoretical knowledge related more closely to interpreting than noticing (logical, if one considers interpretation to involve the transformation of explicit declarative knowledge). Others argue that interpretation can be further divided, for example into explaining and predicting, or into interpreting and decision-making (e.g. Blömeke, Gustafsson, & Shavelson, 2015; Stürmer et al., 2013). The hypothesised structure for the current study is considered further in Chapters 2 and 3.

1.4.2 Pedagogical facets

Considered next are the pedagogical facets of knowledge needed by early childhood teachers to support children's oral language skills. It remains an open question whether oral language knowledge exists as a distinct construct separate from other domains, particularly literacy. Most existing studies of pedagogical content knowledge assume a subject-specific approach; unsurprising, given that they have been conducted primarily with middle- or secondary-education subject teachers of mathematics or science. It cannot be assumed that the knowledge of early childhood educators (who support all domains of teaching and learning) will follow these subject-specific patterns. Indeed, findings from the handful of studies which have explored dimensionality are equivocal.

One recent study concluded that oral language- and literacy-related *content* knowledge form two distinct dimensions (Cash et al., 2015), while a second found that *pedagogical* knowledge of language modelling forms a unidimensional construct with knowledge about feedback quality and instructional learning formats (Jamil et al.,

2015). Findings on the dimensionality of observed early childhood pedagogical practice show that language-supporting practices are often conflated with other domains of interactions and instructional practice, for example whole-group activities for play and learning, behaviour management, positive staff-child interactions and support for peer interaction (Early, Sideris, Neitzel, LaForett & Nehler, 2018). Despite this, there is a strong case to be made for a subject-specific approach to inform oral-language-related training and professional development. This study therefore focuses on oral language-related knowledge, while acknowledging that it may form part of a wider construct.

Within the domain of oral language pedagogy, what do educators need to know? As noted, teachers need procedural knowledge about learners and learning, and about organising and representing content for learners. Although both are important, there are limits to the extent that one assessment tool can cover all aspects of teaching and learning within a domain. This work focuses, initially, on pedagogical strategies to support oral language learning, with the intention of extending at later stages of development to address knowledge of child cognitions.

A review of the literature was conducted to identify the pedagogical strategies known to support children's skills relating to pragmatics, vocabulary, morphology, syntax and narrative. It focused largely on literature from the western world, including the UK, United States, Canada, Chile, Mexico, Norway, Italy, Turkey, Greece, the Netherlands and Finland; but also included a small number of Asian studies. Studies reviewed include those with typically-developing children and those with language delay, monolingual and bilingual populations, and specific populations such as immigrant families. Six overarching strategies were identified, and are addressed in turn:

1. adults modelling language for children,
2. providing explicit information about word meanings,
3. conversation and conversational responsivity - facilitating conversation,
4. conversation and conversational responsivity - relationships and the child,
5. promoting higher order language and thinking,
6. meaningful and engaging contexts for language learning.

In reviewing strategies, greater emphasis was given to interaction-based techniques than strategies relating to classroom organisation/structures, the physical environment and resourcing, and the assessment of children's language. This approach

was informed by the social-constructivist view that children acquire language primarily - although not exclusively - through social interactions with adults, who act as language models and facilitate the conversations which allow children to rehearse language skills and engage in joint construction of meaning in a shared social context (Bruner, 1975; Bronfenbrenner & Morris, 2006). The six identified strategies are known to support both children's later language and literacy development (Hirsh-Pasek et al., 2015; Rodriguez & Tamis-LeMonda, 2011; Rowe, 2012; Romeo et al; 2018) and development in other domains, including executive functioning (Sarsour et al., 2011), maths ability (Levine, Suriyakham, Rowe, Huttenlocher & Gunderson, 2010) and social skills (Connell & Prinz, 2002).

Adults modelling language for children

Children can only learn language to which they have been exposed (Hindman et al., 2016). As a result, adults play an important role in modelling words and syntactic forms that children are not yet producing, supporting them to develop their own vocabulary and grammatical skills (Chapman, 2000; Hoff & Naigles, 2002).

The lexical quantity, diversity and sophistication of the language which children hear in their early years - in the home or in preschool education settings - predicts preschool vocabulary growth and later vocabulary and literacy outcomes for first and second-language learners; with diversity generally proving a more powerful driver than quantity (Aukrust, 2007; Bowers & Vasilyeva, 2011; Dickinson & Porche, 2011; review of parent effects in Zauche, Thul, Mahoney & Stapel-Wax, 2016). Similarly, the linguistic productivity and grammatical complexity of parent and/or practitioner language predicts children's vocabulary, linguistic productivity and syntactic growth (Justice, McGinty, Zucker, Cabell & Piasta, 2013; Zauche et al., 2016). Justice and colleagues describe these as the 'data providing' features of adult language – the *"...granular aspects of adult talk that provide children with crucial information about linguistic forms and functions"* (Justice, Jiang & Strasser, p. 80). There is evidence that repeated modelling helps children to consolidate and use new language, including nouns and verbs (Majorano, Rainieri & Corsano, 2013; Rowland, Pine, Lieven & Theakston, 2003; Tardif, Shatz & Naigles, 1997), pronouns (Oshima-Takane, Goodz & Derevensky, 1996), stress-changing suffixes (Jarmulowicz, 2001) and wh-question words (Naigles & Hoff-Ginsberg, 1998).

In addition to naturalistic language interactions, books and stories have also been identified as fertile sources of sophisticated vocabulary and grammar, supporting adults to be good language models and enabling children to hear and acquire new words and structures for themselves (Dickinson, Griffith, Michnick Golinkoff & Hirsh-Pasek, 2012; Vasilyeva, Huttenlocher & Waterfall, 2006).

Children also benefit from the broader informational content of language modelled by adults. In one intervention study, pre-schoolers in classrooms where adults used strategies such as elaborated feedback, including vocabulary-rich explanations of activities and events, had better receptive vocabulary at the end of the intervention than children in the control group (Wasik, Bond & Hindman, 2006). It is challenging to isolate the effects of individual strategies, as teachers with richer language may also support children in other ways (e.g. be more conceptually and instructionally-oriented) (Dickinson & Porche, 2011). For example, a recent study found that the data-providing features of teacher talk did not predict preschool vocabulary growth once the effects of other strategies (e.g. communication facilitation) were accounted for (Justice et al., 2018). Despite this, the modelling of rich language has a strong evidence-base, supporting its inclusion within the current framework.

Linguistic responsivity

Linguistic responsivity involves modelling language for children in direct response to their own utterances. While direct imitation is effective for infants and slow-to-talk two-year-olds (Levickis, Reilly, Girolametto, Ukoumunne, & Wake, 2014), the addition of new and temporally-contingent linguistic information is thought to be more supportive of language development for typically developing pre-schoolers (2-4 years) and older children with language impairments (4-6 years) (Nelson et al., 1996; Levickis et al., 2014). Such expansions or 'recasts' are believed to enhance language learning by building on the child's referential focus, attention and language in the moment, which frees up their processing capacity for noticing differences between their own speech and the adult model (Baker & Nelson, 1984).

When expanding or recasting a child's language, the adult *"repeats some or all of the child's words and adds new information while maintaining the basic meaning expressed by the child"* (Cleave, Becker, Curran, Van Horne & Fey, 2015). This additional information could be syntactic, semantic or phonological. Although

definitions of expansion and recasting vary, with some theorists distinguishing between them and others conflating the two, they broadly include responses which retain the modality of the child's utterance but reframe it in a correct form, add more information, or fill in gaps (e.g. *Ball small -> Yes, the ball is small*); or those which provide an alternative modality (e.g. *Him need juice -> Does he need some juice*?) (Nelson et al., 1973; Cleave et al., 2015; Chapman, 2000; Cabell et al., 2015; Nicholas et al., 2001). Although opinion differs on whether a corrective element is required (Saxton, 2005; Leonard, 2011), learning is best enhanced when the adult's correction or addition represents a developmentally appropriate change (Cleave et al., 2015).

A recent meta-analysis concluded that parental expansions and recasts support language development for typically-developing children and those with language impairments, including children in the preschool years (Cleave et al., 2015). With regard to the preschool environment, studies have tended to conflate linguistic extension with broader semantic extension. However, the combined evidence does suggest that extending, expanding or correcting the accuracy of children's utterances - either individually or in combination with other strategies - predicts pre-school language production, vocabulary, multi-word utterances, narrative production and emergent literacy; and also primary reading comprehension, vocabulary and word recognition (Dickinson & Porche, 2011; Girolametto, Weitzman & Greenberg, 2003; Wasik et al., 2006).

Providing explicit information about word meanings

Although children do learn vocabulary through simple exposure, words which have not been consolidated (i.e. 'fast mapped' words) are forgotten quickly (Vlach & Sandhofer, 2012). Providing additional and explicit semantic information helps children to integrate and consolidate new vocabulary into their mental lexicon to promote retention (Henderson, Weighall, & Gaskell, 2013); and optimal learning may occur when approaches combine explicit and implicit instruction (Marulis & Neuman, 2010).

Providing child-friendly definitions, including examples of use, synonyms and antonyms, serves to broaden and deepen children's understanding of meanings and pragmatics, and helps them to integrate new vocabulary with existing knowledge (Blachowicz & Fisher, 2000; Nagy & Scott, 2000). Vocabulary depth (i.e. understanding the nuances of vocabulary usage and multiple word-meanings) is understood to be as

important as vocabulary breadth (i.e. the number of words known) in providing the foundations for later reading comprehension (Ouellette, 2006; Strasser & del Rio, 2014; Proctor, Silverman, Harring & Montecillo, 2012). As a result, strategies to promote deep processing of word meanings (e.g. engaging children in explaining vocabulary, applying definitions, constructing their own examples, or evaluating the appropriateness of a word in a new context) and reinforcement of words and meanings on subsequent days, lead to greater word-learning and better story comprehension, mediated by improved vocabulary knowledge (Beck & McKeown, 2007; Chaplana & Tafa, 2014; Coyne, McCoach, Loftus, Zipoli Jr. & Kapp, 2009; Silverman, 2007).

Children also need broader information about the concepts represented by new words, to develop the rich networks of conceptual understanding which support deep word knowledge. Such conceptual information might include offering examples of what is and what is not part of the concept (e.g. a moth is not the same as a butterfly), additional information and extended discussion (e.g. about what butterflies eat) or concrete experiences (e.g. visiting a butterfly house) (Gonzalez et al., 2010; Neuman, Newman & Dwyer, 2011; Silverman, Crandell & Carlis, 2013). Research shows that preschool children learn words more easily when provided with conceptual supporting information (e.g. *"a fan can help you to keep cool on a hot day")* as opposed to non-conceptual information (e.g. *"my sister gave it to me"*) (Booth, 2009; Nelson, O'Neil & Asher, 2008), and that teachers use of conceptual information is more predictive of end-of-kindergarten vocabulary than their use of declarative information, when controlling for density and diversity of teacher talk and time spent in explicit vocabulary instruction (Bowne, Yoshikawa & Snow, 2017). Clustering new words within conceptual or taxonomic categories also supports vocabulary learning (Neuman et al., 2011). While much research in this area has been conducted in the context of book-reading, there is reason to believe that similar elaborations in everyday conversation would be beneficial.

Gestures, concrete props and other clues to meaning can also be used to support definitions or conceptual information. Although few studies explore their individual contribution to children's vocabulary development in the pre-school context, Zauche and colleagues (2016) conclude in their comprehensive review that gesture use during

speech is related to more advanced receptive and expressive language skills in children up to the age of four. Studies of children with specific conditions such as Down's Syndrome have also identified benefits of signing interventions in the infant and pre-school years (e.g. Launonen, 1996).

Conversation and conversational responsivity

The context within which children use and apply language also matters. Since language is acquired socially, multi-turn conversations with adults are among the most powerful vehicles for language learning (Romeo et al., 2018). Conversations are thought to offer optimal conditions because they enable children to use multiple cues (perceptual, social, linguistic) and allow them to rehearse their skills in a social context, receiving feedback from adults who adjust their language and response according to the child (Hirsh-Pasek, Golinkoff, Hennon & Maguire, 2004; Weizman & Snow, 2001; Zimmerman et al., 2009).

This notion of conversational responsivity encompasses an array of strategies used by adults to initiate and sustain multi-turn conversations (Bonifacio et al., 2007), which can broadly be categorised into behaviours focused on facilitating communication and conversation, and those promoting positive relationships and child wellbeing. Such responsivity is thought to maximise the extent to which children's cognitive resources are available for learning by allowing them to maintain their focus of attention, and to provide a motivating context for talk through engagement with an 'interested other' (Landry et al., 2006; McCathren, Yoder & Warren, 1995, 1999; Nelson, 1989; Tomasello, 1988). Parental responsivity predicts a vast array of language, literacy, social-emotional, school-readiness and cognitive outcomes (Landry et al., 2001; 2003, 2006; Romeo et al., 2018; Zauche et al., 2016). Research in the preschool context also identifies benefits of teacher responsivity for language production, vocabulary development and increased peer interactions (Girolametto & Weitzman, 2002, 2003, 2006; Piasta et al., 2012; Justice et al., 2018).

Facilitating communication and conversation

Communication-facilitating behaviours draw communication from the child, engage them in extended multi-turn conversations, and promote joint engagement. A recent study exploring the unique contributions of different strategies concluded that *only*

communication facilitating behaviours predicted growth in vocabulary of preschool children, with no effects identified for language modelling or language-developing responsivity (Piasta et al., 2012; Justice et al., 2018). The authors hypothesised that joint attention might be more challenging in the preschool than the home environment, and that communication-facilitation moderates the impact of other dimensions (i.e. sufficient communication must take place in order for children to benefit from teachers' language-developing techniques). Dimensionality testing revealed a coherent communication-facilitating factor comprising the following techniques: looking expectantly/being warm and receptive to encourage interaction, using a slow pace of conversation to allow participation, and using open-ended questions to stimulate conversation.

Other strategies supported by the literature include the use of direct elicitations (e.g. questions), allowing children time to respond, listening to what they say, responding in a meaningful way, being face-to-face, encouraging turn-taking, involving non-participating children, and promoting peer interaction and communication (Dickinson, 2001a; Girolametto, Weitzman and Greenberg 2003, 2004; Justice, Weber, Ezell, & Bakeman, 2002; Wasik et al., 2006), with benefits identified for language productivity and diversity, receptive vocabulary, peer interactions and peer communication. The notion of conversational responsivity, or semantic extension, is also relevant, whereby an adult continues the topic or theme and adds new information (Cleave et al., 2015; Chapman, 2000). This supports continuation of the conversation by prompting the child to make a further contribution and provides additional linguistic input for the child (Cabell et al., 2015). Questioning as a technique has received particular attention, particularly in relation to dialogic reading, with different types of questions understood to serve different functions. Low-demand questions (closed wh-questions, yes/no questions) foster the child's confidence and encourage them to engage (Price, van Kleeck & Huberty, 2009; Van Kleek et al., 1997; Zimmerman et al., 2009), while more open-ended questions prompt children to think more deeply and provide cognitive challenge (Blewitt et al., 2009; Coyne et al., 2004; Strouse et al., 2013; Wasik et al., 2006).

Finally, the elicitation of children's vocabulary warrants a specific mention. In addition to hearing adults model new words, children need to use and apply new words and

meanings to assimilate them into their own vocabulary. There is strong evidence that word retention is enhanced by opportunities for word retrieval, which serves to reactivate and consolidate knowledge - extending learning beyond the initial fast-mapping of new word labels (Damhuis et al., 2015; Roediger & Butler, 2011; Van den Broek, Segers, Takashima & Verhoeven, 2014). For example, teachers might ask open-ended questions (Mol et al., 2009; Walsh & Blewitt, 2006), use completion prompts, or provide opportunities to interact with words across a variety of contexts (Beck, McKeown, & Kucan, 2013).

Relationships and the child

Although less proximally-related to language, behaviours focused on the emotional and the relational may also play a role in facilitating communication and language development. In the first three years, the extent that caregivers respond to children's cues, recognise their needs or wants, and limit negative, intrusive, restrictive or controlling interactions, is associated consistently with increased language and cognitive outcomes (Zauche et al., 2016). In the preschool context, such sensitive and responsive behaviours can be viewed through the lens of relational pedagogy, which places interactions and communication at the centre of learning - valuing sensory and emotional experiences, children's self-esteem and self-worth, and their close relationships (Papatheodorou & Moyles, 2009). Evidence for the importance of relational pedagogy can be drawn from studies using the CLASS rating scale (Pianta, Le Paro & Hamre, 2008), which includes emotional support (e.g. positive climate, teacher sensitivity, regard for student perspectives) as one factor.

Findings regarding preschool effects on language development are mixed, with some studies identifying effects for pre-school vocabulary and expressive language (Curby et al., 2013), and others identifying effects for social skills and reduced behaviour problems but null effects for language development (Leyva et al., 2015; Burchinal et al., 2010). Similarly, the quality of the teacher-child relationship (e.g. closeness, conflict) has been shown to relate to social development, but findings are mixed with regard to language development (Pianta & Stuhlman, 2004; Peisner Feinberg et al., 2001). There is, therefore, some evidence that sensitive and responsive behaviours may support language development, possibly by encouraging a climate in which

children feel confident and motivated to communicate with adults, but direct evidence is weaker than for explicit language-supporting strategies.

Promoting higher order language and thinking

The benefits of conversation are thought to be even greater when the conversations are cognitively challenging for the child. Research has focused particularly on the use of decontextualised or inferential language (Curenton & Justice, 2004; van Kleeck, Woude & Hammett, 2006; Snow, 1983) - also known as non-immediate, abstract or representational talk. This includes talk about events, objects or feelings in the past or future, or of an imaginary or hypothesised nature, requiring the child to remember, reason, fantasise, imagine, problem solve, predict, hypothesise, draw inferences or analyse information beyond the immediately available context (Blank, Rose, & Berlin, 1978; van Kleeck, Gillam, Hamilton & McGrath, 1997; van Kleeck et al., 2006, Sorsby & Martlew, 1991). The use of inferential language can support growth in children's language and literacy skills, including vocabulary development, abstract language skills, narrative skills and reading comprehension (Rowe, 2013; van Kleeck et al., 1997; Snow, Tabors & Dickinson, 2001).

Open-ended questions have been highlighted as particularly valuable in supporting cognitively challenging conversations, because they tend to elicit more communication and extended responses from children than commenting or using closed questions, and place fewer constraints on children's responses (de Rivera, Girolametto, Greenberg, & Weitzman, 2006; Justice, Weber, Ezell, & Bakeman, 2002; Valdez-Menchaca & Whitehurst, 1992). The use of open, inferential questions and analytic talk during book sharing has been found to benefit abstract language and vocabulary skills (van Kleeck et al., 2006), including vocabulary to fourth grade, mediated by gains in kindergarten receptive vocabulary (Dickinson & Porche, 2011). Engaging preschool children in extended narrative conversation through using open questions, context-eliciting questions and encouraging verbalisations (e.g. 'uh-huh', 'really?') has been shown to improve vocabulary and narrative skills (Peterson, Jesso & McCabe, 1999).

Meaningful and engaging contexts for language learning

The final theme relates to the provision of appropriate contexts for language-learning. Although this does not fall strictly within the remit of adult-child interactional

strategies, the role played by context in providing motivation and meaning for the child is so intimately related to effective interactions that it cannot be ignored. As Harris, Golinkoff and Hirsh-Pasek (2011, p.52) argue in relation to vocabulary development, *"children learn words for things and events that interest them…and learn words best in meaningful contexts".*

The first pedagogical strategy of note is joint attention: engagement in, and use of language contingent upon, the child's focus of attention or discussion. Joint attention, related closely to conversational responsivity, maximises the cognitive resources available for learning and provides a motivating context for talk through engagement with an 'interested other' (Tomasello, 1988; Yoder & Warren, 1999). In contrast, when adults try to redirect the child's focus of attention or talk about things not of interest to the child, learning is inhibited (Dunham, Dunham & Curwin, 1993). The use of contexts which are engaging and concrete, particularly learning through play, can also promote language learning. For example, introducing and using language though playful activities, particularly where learning is guided by an adult, promotes attention, motivation and language (Harris, Golinkoff & Hirsh-Pasek, 2011; Hirsh-Pasek, Golinkoff, Berk & Singer, 2009). Children who take part in guided play extension activities after being introduced to words during book reading show greater gains in receptive and expressive vocabulary than children who receive only explicit instruction (Han, Moore, Vukelich & Buell, 2010; Spiewak Toub et al., 2017). The physical context is also important, with a small-scale case study from England concluding, for example, that children's lexical diversity was richer in a natural environment than in indoor and outdoor classrooms (Richardson & Murray, 2017).

Finally, adults can support children by making connections with prior learning or discussions, and by organising learning in ways which are meaningful for children. This might include making connections to other classroom experiences or topics, providing concrete resources to support new vocabulary or stimulate thematic play (e.g. hard hats, hammers, screwdrivers and tool-belts to support construction play), relating storybook context to the real-life experiences of the children, or providing follow-up experiences and resources in varied contexts (e.g. puppets to support children in acting out new words) (Coyne et al., 2007; Harris, Golinkoff & Hirsh-Pasek, 2011; Neuman, Newman, & Dwyer, 2011; Silverman, 2007; Wasik and Bond, 2001). In

relation to vocabulary-learning, this links closely with the strategies identified above to promote consolidation and deep learning of new words and concepts.

To conclude, the combined evidence indicates that adults can support young children to develop their language skills by modelling rich language and providing explicit information about word meanings; through conversational responsivity and sensitive adult-child relationships; by promoting higher order language and thinking; and by providing meaningful and engaging contexts for language learning. This study used these six pedagogical strategies to form the framework underpinning the development of the Observing Language Pedagogy (OLP) tool. The following sections describe the development, piloting and preliminary validation of the OLP as follows:

- **Chapter 2 'Research Questions and Methodology'** sets the scene for the current study, presenting the conceptual and methodological frameworks, the research questions and the study rationale. It also details the process of concept/domain delineation, measure design and item generation.
- **Chapter 3 'Findings'** addresses the psychometric properties of the OLP, including reliability and dimensionality testing, convergent validity and preliminary validation.
- **Chapter 4 'Discussion'** considers implications of the study findings for the understanding and assessment of oral language-related pedagogical content knowledge, and for the design of teacher qualifications and professional development.

CHAPTER 2: RESEARCH QUESTIONS AND METHODOLOGY

2.1 Conceptual and methodological frameworks

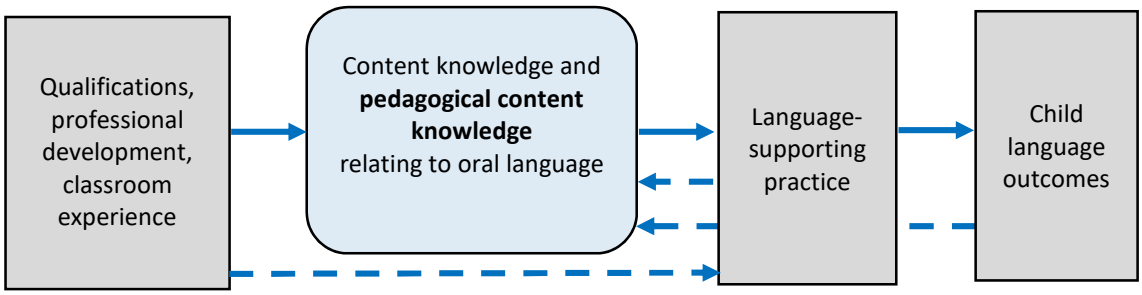
The target construct is teachers' pedagogical content knowledge relating to preschool oral language development. In particular, this research focuses on dynamic procedural knowledge, defined for the purposes of this study as:

> *"the pedagogical knowledge needed by teachers to make effective in-the-moment instructional decisions relating to a specific domain of learning and development".*

As described in Chapter 1, pedagogical content knowledge is related to, but distinct from, content knowledge. Content knowledge reflects the subject-specific matter to be taught (the '*what*'), while pedagogical content knowledge reflects teachers' understanding of how best to represent that content for learners (the '*how*') (Shulman, 1986, 1987). Pedagogical content knowledge is also conceptually distinct from the *general* pedagogical knowledge (e.g. of classroom management), which applies across subject domains.

Pedagogical content knowledge is assumed to be developed through pre-service qualifications, in-service professional development and classroom-based experience, and is hypothesised to mediate effective practice which leads to positive child outcomes (Figure 2.1). This is a simplistic representation and, in the real world, relationships may not be neatly linear. For example, teachers may directly (and somewhat mechanistically) apply an idea gained from professional development to their practice, but may then derive new knowledge and understanding from observing the ways in which these changes influence children's learning - as shown by the dashed lines in Figure 2.1. The mediating role of knowledge in improved practice, shown by the solid lines, is the primary pathway of interest in this research.

Figure 2.1. The role of knowledge as a mediator in improved practice (and child outcomes)



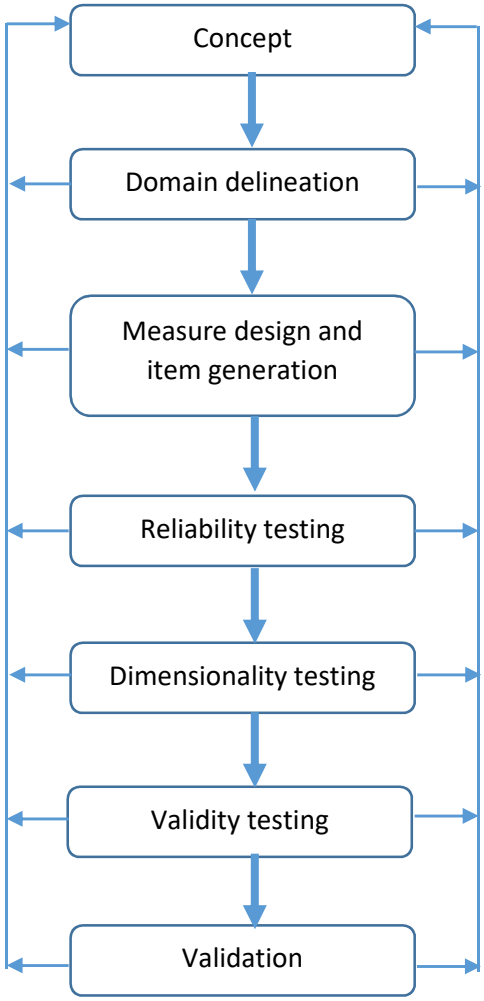
The study's primary aim is to develop and pilot a tool which can capture and assess the dynamic procedural knowledge of in-service early childhood teachers relating to support for children's oral language development. The **'Observing Language Pedagogy (OLP) Tool'** uses video vignettes of real classroom interactions to provide a situated and contextual means of eliciting this 'knowledge-in-action'. More widely, it is hoped that the study and resulting tool will contribute to conceptual understandings of procedural knowledge relating to language development, and enable more effective design of workforce development efforts by allowing the role of knowledge in developing professional expertise to be more accurately studied.

Methodological framework

Viswanathan's (2010) framework for measure development (Figure 2.2) was selected to provide a methodological structure, primarily because of its emphasis on the later stages of development feeding back to further refine understandings of the relevant construct. Given that understanding of procedural pedagogical knowledge are still developing, particularly in relation to oral language development, such an iterative approach is essential. As Viswanathan notes:

> *"[the stages in measure development] are often blurred and iterative. These steps emphasise that traversing the distance from the conceptual to the operational requires a systematic process. Rather than consider a concept and move directly to item generation and use of a resulting measure, the distance between the conceptual and the operational has to be spanned carefully and iteratively" (2010 p.286).*

Figure 2.2. Framework to guide the development of a new measure (Viswanathan, 2010)



The OLP tool is piloted within the context of a wider randomised controlled trial (RCT) in 117 schools, designed to evaluate an oral language professional development intervention for preschool teachers. The current study uses data from 104 teachers (n=72 schools) to explore the psychometric properties of the OLP, including its ability to predict observed quality of practice, and to discriminate between intervention and control group respondents. While the link between practice and child outcomes is represented in Figure 2.1, it must be assumed for the purposes of the current study. At a later date, it will be possible to validate the OLP against child outcome data gathered as part of the wider RCT.

2.2 Research questions

The primary research question posed by the study is:

What is the potential of the Observing Language Pedagogy Tool (OLP) to evaluate the dynamic procedural pedagogical content knowledge of in-service early years teachers, in relation to strategies to support early language skills?

Regarding the psychometric properties of the OLP, the study asks more specifically:

1. Is there sufficient variability in OLP scores to form a useful measure?
2. Is the OLP internally consistent, and what is its dimensionality?
3. To what extent does the OLP predict the quality of respondent's classrooms, as measured by observational rating scales?
4. Does the OLP show evidence of convergent validity?
5. To what extent can the OLP assess change in knowledge through intervention?

Regarding educational implications, the study asks more specifically:

1. What are the implications for the *understanding* of pedagogical content knowledge relating to oral language development?
2. What are the implications for the *assessment* of pedagogical content knowledge relating to oral language development?
3. What are the implications for the *professional development* of early years teachers relating to oral language development?

2.3 Rationale and context

2.3.1 To measure or not to measure

In order to inform the design of professional development across a diverse workforce, it is important to understand whether oral-language-related procedural knowledge matters and, if so, which aspects are most important. This requires the *measurement* of such knowledge, so that its relationships with practice and child outcomes can be established.

One cannot, of course, measure a construct before defining it. It is important to know precisely what is meant by procedural pedagogical content knowledge, and what it mean to say that it has improved (McGrane, 2018). In the early stages of construct definition, qualitative and exploratory approaches are required. However, as set out in the literature review, enough is already known about the potential components of procedural pedagogical knowledge to inform the development of a measure for piloting. The current study thus aims to create an instrument to *quantify* teachers' procedural knowledge relating to early language pedagogy, enabling measurement across contexts, and validation against measures of practice and child outcomes.

As described in Chapter 1, previous attempts to assess pedagogical content knowledge using multiple-choice questionnaires have, almost without exception, failed to predict practice or child outcomes. It is proposed that this failure may be due mainly to methodological issues. Since questionnaires rely on explicit recall, they are ill-suited to capturing knowledge which may have developed through experience (Alonzo & Kim, 2018). In addition, their inherently de-contextualised nature makes them inappropriate for capturing the procedural 'knowledge-in-action' needed to guide decision-making in specific classroom contexts (Schachter et al., 2016).

This study builds on emerging research using video assessment to provide a more situated measure capable of eliciting both informal/tacit and explicit procedural, pedagogical knowledge (Jamil et al., 2015; Kersting, 2008; König et al., 2014). While previous studies showed promise, they were conducted almost exclusively with middle and secondary teachers of maths and science. The only identified study focusing on early childhood addresses knowledge relating to a broad range of adult-child interactions (Jamil et al., 2015). The current research extends this emerging field through the development of a fine-grained video measure focused explicitly on defining and assessing procedural knowledge relating to oral language development. In addition to enriching understandings of procedural knowledge, the wider goal is to support the conduct of research to inform the design of oral-language-related professional development.

The **Observing Language Pedagogy** (OLP) tool's development is grounded in three premises:

1. that video vignettes of classroom practice are more akin to real classroom situations than questionnaire scenarios, and can provide a more authentic and contextualised means of assessing pedagogical content knowledge (Alonzo & Kim, 2018), particularly knowledge which may have developed informally or tacitly through experience and thus be hard to elicit using questionnaires;
2. that expert teachers perceive and interpret classroom events differently from novices and are better equipped to identify, and to interpret, salient instructional interactions (e.g. Berliner, 1986);
3. that the ability to notice and interpret effective strategies being used by others is an important precursor to being able to apply these same strategies to personal practice (Jamil et al., 2015; van Es & Sherin, 2002, 2006).

Although the overall approach taken was quantitative, the development of the OLP, building on a long tradition of research tool development, was informed by many qualitative judgements. The coding frame, though predetermined deductively based on theory and research, was refined inductively using empirical responses from the pilot. Its development was iterative, and drew from both the qualitative and qualitative spheres (Robson, 2011).

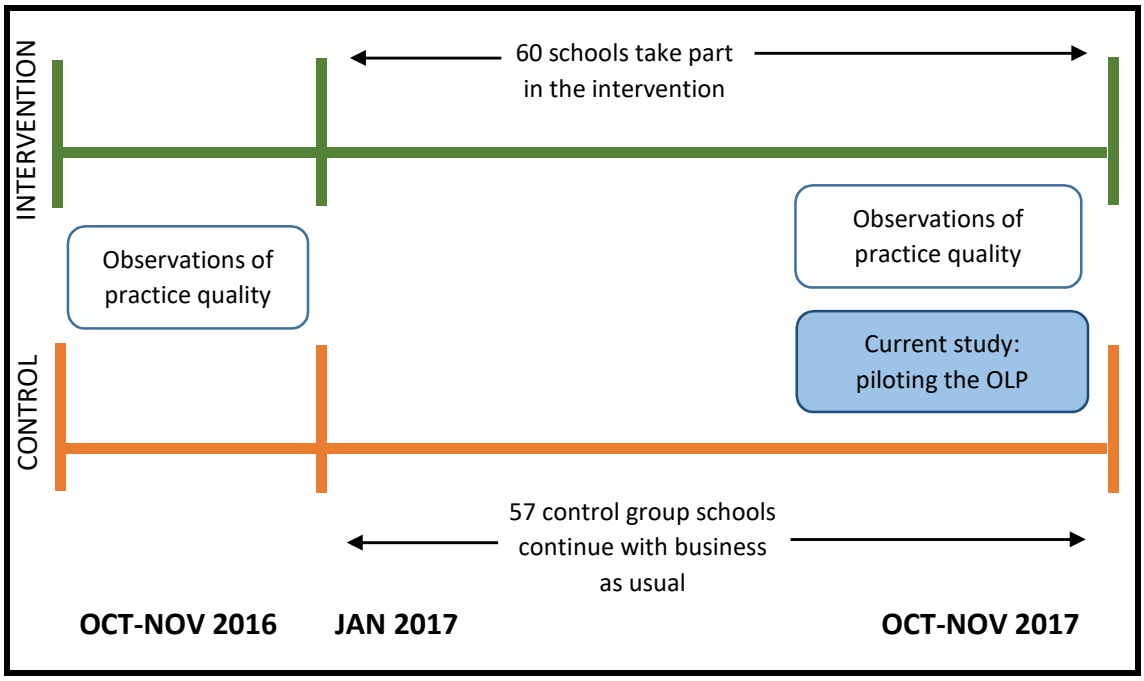
2.3.2 Identifying a context for measurement

Since few existing measures of pedagogical content knowledge have been tested robustly using designs which control for external variables, this study sought an experimental context for validating the OLP. It was situated within an existing randomised controlled trial (RCT), designed to evaluate the impact of a professional development intervention. The intervention aimed to support in-service teachers of preschool children in improving the quality of their language-supporting practice, and had an explicit focus on developing teacher knowledge.

The RCT offered a means of establishing whether the OLP could discriminate between teachers who had taken part in the intervention and those who had not. It also enabled the predictive ability of the OLP to be tested, using observational data gathered on the quality of language-supporting practice in participating schools. At a later date, child outcome data will become available, providing a further means of validation. The timeline and main elements of the wider RCT are shown below. Sixty schools took part in the intervention between January and November 2017, while a

further 57 formed the control group. The OLP was piloted at the post-test stage of the wider study.

Figure 2.3. Design of the wider RCT and timing of the current study (shown in blue)



The observations of practice quality within the wider RCT were conducted using three research-validated Environment Rating Scales (ERS) known to predict children's development: ECERS-3, ECERS-E and SSTEW.[3] These systematic and structured observations assume that quality can be defined as a "*collection of measurable characteristics in the childcare environment that affect children's social and cognitive development*" (Siraj-Blatchford & Wong, 1999, p.10). As with all such tools, they capture only a partial view of 'quality' (Kane & Cantrell, 2013) and associations with child outcomes are modest (Sabol, Soliday Hong, Pianta & Burchinal, 2012). However, they allow us to establish whether the domains of pedagogical content knowledge identified through theory and research are related to *some* observable behaviours which relate to children's development. The ERS assessments were conducted by a team blind to group allocation before the intervention began (Autumn 2016), and again at the end of the intervention (Autumn 2017).

[3] ECERS-3 (Harms, Clifford & Cryer, 2014); ECERS-E (Sylva, Siraj & Taggart, 2003); SSTEW (Siraj, Kingston & Melhuish, 2014). Validation: OPRE, 2010; Taggart et al., 2015

2.3.3 Description of the intervention being evaluated within the wider RCT

The professional development intervention evaluated within the wider trial was designed to support preschool teachers to improve the quality of support for oral language development in their classrooms, with resulting gains in children's language skills. The key oral language domains targeted were pragmatics, narrative, vocabulary and grammatical development.

The programme comprised six days of training and up to three days of individual mentoring support per school, spanning just under one year. Teachers attended the training and were then expected to implement the approach within their classrooms, including engaging their wider team. This process was supported by a mentor, who provided up to three days of classroom-based support to each school across the intervention period.

The intervention was underpinned by theory and research relating to children's language development and language-supporting pedagogy, and by research relating to the characteristics of effective professional development. Its core components were:

1. a set of underpinning Language Learning Principles summarising the research evidence on how children learn language, and the pedagogical strategies which best support development (Appendix 1). These represent the *theoretical* knowledge which the programme aimed to foster;
2. research readings and other evidence-based resources, used to further deepen knowledge and understanding, and to provide evidence-based strategies for implementation;
3. use of research tools to support self-evaluation and improvement, including the Environment Rating Scales (ERS). During training, teachers watched videos of effective practice and were supported to use the language principles and ERS to 'tune in' to language-supporting practice. Back in their classrooms, they were encouraged to use these same tools to observe and evaluate their use of evidence-based practice, and to identify potential improvements. This approach was based on the above-cited premise, that the ability to notice strategies used by other practitioners supports teachers in applying these same strategies to their own practice. This element of the intervention represents the *procedural* pedagogical knowledge which the programme aimed to foster. The focus on

noticing makes the RCT an ideal test-bed for piloting a video-based pedagogical measure, since the noticing abilities of teachers in the intervention group could be expected to improve as a result of participation (e.g. Hamre et al., 2012);

4. support for assessing children's language skills;
5. time for reflection, discussion and sharing of practice during training days, with a focus on implementation of new strategies within the classroom;
6. time for implementation between workshops, with class-based activities and mentoring to scaffold implementation and support further development of procedural knowledge;
7. support for action-planning and improvement, and in planning for language development.

2.4 Concept and domain delineation

In this section, the aspects of procedural pedagogical content knowledge to be assessed by the OLP tool are delineated based on the literature review.

2.4.1 Pedagogical facets of oral-language related knowledge

To be effective in supporting young children's language development, teachers need knowledge about learners and learning, and knowledge of how to organise and represent language-related 'content' for learners (Schulman, 1986, 1987). The OLP focuses on the latter, aiming to assess knowledge of language-supporting pedagogical strategies, and of how to apply appropriate strategies in specific classroom contexts for specific children, adapting as appropriate. Later iterations may extend to the consideration of learner-related knowledge.

The pedagogical strategies included within the OLP framework were those identified within the literature review as supporting children's pragmatic, vocabulary, grammatical and narrative development (see summary in Table 2.1). The OLP focuses primarily on adult-child interactions, rather than on the organisation and structure of learning activities, curriculum, planning, or assessment of children's learning. There are two reasons for this: first, the OLP aims to capture the dynamic knowledge needed to support in-the-moment classroom decision-making; and second, there is good evidence that adult-child interactions provide the most powerful vehicle for promoting language development (Bruner, 1975; Bronfenbrenner & Morris, 2006). The

framework does, however, acknowledge the importance of setting such interactions within the context of meaningful and engaging contexts for language-learning.

Table 2.1 The pedagogical facets of knowledge addressed by the OLP

1. Adults modelling language for children
2. Providing explicit information about word meanings
3. Facilitating communication and conversation
4. Promoting higher order language and thinking
5. Relationships and the child
6. Meaningful and engaging contexts for language learning

2.4.2 Cognitive facets of oral-language-related procedural pedagogical knowledge

As set out in Chapter 1, procedural knowledge is situated - and shapes decision-making within - real and specific classroom contexts. This research focuses on the dynamic procedural knowledge-for-action which guides in-the-moment teaching interactions (Knievel et al., 2015). As noted, this first stage of OLP development aims to capture knowledge of pedagogical strategies, rather than knowledge of learners and learning.

The first facet of procedural knowledge is tacit or informal knowledge developed during classroom experience, via 'noticing' (van Es & Sherin, 2002, 2006). Tacit knowledge is unconscious and may be difficult for practitioners to articulate. Informal knowledge may have developed explicitly (e.g. through professional dialogue in the classroom) and be articulable; but it is likely to be communicated using non-specialist terminology.

The second facet is explicit procedural knowledge, developed through the application of declarative knowledge (Schneider & Shiffrin, 1977) which has been gained during qualification and professional development. Such knowledge is formal and articulable.

The third is analytical procedural knowledge, understood to involve the reframing and transformation of explicit knowledge, and distinguishable empirically as a distinct facet (König et al., 2014; Kersting, 2008). Table 2.2 summarises the three facets of procedural knowledge addressed by the OLP.

Table 2.2 The three facets of dynamic procedural knowledge relating to oral language pedagogy

Facet	Description	A teacher with such knowledge might….
Noticing/ knowing how: **PROCEDURAL KNOWLEDGE**	Ability to identify and enact pedagogical strategies salient for a specific context, adapting as appropriate. May be informal or tacit.	….naturally recast children's language when they make grammatical mistakes with irregular verbs (e.g. "I runned fast" -> "You ran fast!") without being able name the technique as a recast, or articulate clearly how or why she is using it.
Articulating how: **EXPLICIT PROCEDURAL KNOWLEDGE**	Explicit, formal and articulable knowledge of the pedagogical strategies which best support learning and development.	… know that recasting is an evidence-based strategy for developing children's language skills, and the different forms a recast might take, and have developed deeper *explicit* procedural knowledge of recasting as a result. For example, she may be more intentional and specific about her use of recasting within classroom situations, more aware of her own developing skills, and more observant of the effects on children, enabling her to refine and improve her use of the technique. She will also be able to articulate her knowledge to others.
Reasoning about how /why: **ANALYTICAL PROCEDURAL KNOWLEDGE**	Ability to *reason about* and *interpret* classroom situations, and select from a range of alternative strategies to achieve a specific pedagogical purpose and child outcome.	…. use recasting with a greater degree of intentionality within classroom contexts in order to promote optimum learning and development, deliberately selecting from a range of potential strategies and adapting as needed (as well as being able to articulate this decision-making process).

2.5 Measure design and item delineation

The design of the Observing Language Pedagogy tool drew on, adapted and extended the methods in prior studies using video-based assessment. These include efforts to assess the pedagogical knowledge of secondary education maths and science teachers (Kersting, 2008; König et al., 2014; Voss et al., 2011), and one tool designed to assess the procedural knowledge of preschool teachers in relation to generally-effective adult-child interactions (Jamil et al., 2015).

Practitioners were asked to watch and respond to a series of short video vignettes showing adult-child interactions within an early childhood classroom environment. This section discusses the selection of video vignettes, the administration format and the design of prompts used to elicit response.

2.5.1 Selection of video clips

The number of vignettes used in studies reviewed ranged from two to ten (e.g. Jamil et al., 2015; Kersting, 2008). Six were selected for pre-piloting in the current study, chosen to reflect good practice across all the pedagogical strategies shown in Table 2.1. All six showed experienced teachers within state-maintained primary or nursery schools working with children aged between three and five years. They were drawn from commercially available footage, and from a video which the author was involved in producing, and for which she had the relevant permissions. The clips were edited, either to ensure the inclusion of specific pedagogical strategies, or to exclude any segments judged not to provide useful material. All were between two and three minutes long once edited. None had been used as part of the intervention.

The six clips were piloted with 20 teachers in the autumn of 2017, and reviewed by two experts with research-specialism in language development and pedagogy, to establish content validity. Responses were evaluated for depth, breadth, and the extent to which it was possible to discriminate between good and poor responses. Three vignettes were selected for the final survey, and are summarised in Table 2.3. Taken together, they reflect multiple contexts and children with differing language abilities. The vignettes are provided for viewing on the attached CD-ROM, and transcripts are shown in Appendix 2.

Table 2.3 Overview of the three OLP video vignettes

Vignette title	Description
1. Block Play	A practitioner and child interacting in the block area during child-initiated play
2. Niaz Makes a List	A practitioner supports a child to 'write' a shopping list as part of child-initiated play (other children are also present)
3. Niaz, the Princess and the Dragon	An imaginative story previously heard by the children is re-told across multiple contexts: with the whole class, outdoors during child-initiated play

2.5.2 Administration format

The OLP was administered online using the internet-based platform Survey Monkey. Many advantages to online surveys have been identified in comparison with paper-based approaches, including cost, flexibility, access to large and geographically-diverse samples, and potential reductions in researcher effects (Best & Krueger, 2004; Evans & Mathur, 2005; Gosling, Vazire, Srivastava & John, 2004; Hewson & Laurent, 2008; Skitka & Sargis, 2006). In relation to survey risks such as social desirability bias, internet surveys perform similarly to paper-based approaches (Dodou & de Winter, 2014). Potential disadvantages of online approaches include reduced researcher control (Stieger, Reips & Voracek, 2010), relatively low response rates (Shih & Fan, 2008) and relatively high levels of item non-response (Heerwegh & Loosveldt, 2008).

On balance, the risks were considered to be acceptable given the practical advantages of online methods. The ability to access participants across the relatively wide geographical areas of the RCT was particularly important within the current context. To mitigate potential risks, additional care was taken to achieve a good response (e.g. using reminders).

A further important consideration relates to the ethics of online methods. Roberts and Allen (2015) raise the issue of informed consent, arguing that participants may be more likely to bypass an information sheet when completing online surveys. They discuss the value of including the information sheet as the first page of a survey, and requiring participants to check a box to indicate consent *before* accessing the survey, to ensure parity with paper-based approaches. Following consideration of the issues, the consent questions were included on the final page, but an additional paragraph was included in the introductory email to make respondents aware that participation was voluntary, and that their consent would be requested at the end of the survey. The introductory text and consent questions are shown in Appendix 3.

A full ethics application for the study was completed prior to the start of the research, and received clearance from the UCL Research Ethics Committee. The application is shown in Appendix 4.

2.5.3 Designing the prompts and items

Items and prompts were designed to elicit the three facets of dynamic procedural knowledge in Table 2.2 (procedural, explicit procedural and analytical), taking into account the ways in which each are understood to be codified.

The OLP is based on the premise that the mechanism of 'noticing' is implicated in the development of all three facets. Noticing (and the related notion of professional vision) involves a teachers' ability to perceive what is happening within the classroom, and to make professional sense of it (e.g. Stürmer, Seidel & Schäfer, 2013; Sherin, 2001; Darling-Hammond, 2010). The second premise is that experts and novices notice different things when making observations (Feldon, 2007) and are better equipped to analyse problems and situations (Glasser & Chi, 1988). The third is that teacher noticing in the context of video vignettes provide a means of eliciting and assessing underlying procedural knowledge (Kersting, 2008); that is, by assessing teachers' ability to '*notice how',* one can tap into their ability to '*know how*' to enact specific strategies within specific classrooms contexts.

Prompts within previous video assessment studies (see Chapter 1) ranged from multiple-choice Likert-scaled items to extended open-response items requiring deeper analysis of interactions. As an explicit aim of the study was to identify what teachers attended to within the clips, pre-determination of responses using a forced-choice format was considered undesirable. Equally, allowing an entirely free response - while supporting potential depth of information - risked restricting the extent to which respondents reported the breadth of strategies that they noticed within the videos. The approach selected was a middle ground: a semi-structured open-response format, to be coded using clear and low-inference decision-rules.

Due to the existing research demands on teachers within the wider RCT, brevity was paramount. With a goal to keep completion times to 30 minutes, some compromises were necessary in relation to coverage. Priority was given in the first instance to delineating and capturing the range and salience of pedagogical strategies noticed (and thus known) by teachers in relation to support for oral language development. These were reflected in:

- Three '**Strategy' Scores**, reflecting the pedagogical techniques noticed by teachers within each vignette as being salient for supporting oral language

development. The Strategy Score is considered to reflect procedural knowledge of language-developing strategies which may be codified tacitly or explicitly (formally or informally).

- Three '**Use of Expert Term' Scores**, reflecting the extent to which teachers used specialist terminology to describe the strategies they identified within each vignette. This is considered to indicate formal, explicit and articulable understanding developed via the enactment of theoretical knowledge. Thus, explicit knowledge is captured within a dynamic context (i.e. to describe real interactions in situated classroom contexts).

These items were elicited using a single prompt, requiring teachers to identify the pedagogical strategies that they observed within each of the three vignettes:

> *"Watch the clip and identify the strategies this practitioner is using which might support children's language development. This could include children's understanding of language and/or their expression.*
>
> *If you can, try to record strategies which support a range of language skills (e.g. communication, narrative, vocabulary and/or grammatical skills). You can watch the clip again if you need to, or refer to the transcript. Use the eight boxes below to record your answers. List as many strategies as you can, but if you identify fewer than eight you can leave some boxes blank."*

Respondents could provide up to eight responses per video (24 across the three vignettes). In the pre-pilot, respondents were able to provide up to 5 responses. However, this limited the scope for discriminating between respondents, so was extended for the main pilot study. Example responses include:

- "*uses open questions*"
- *"uses how and why questions"*
- *"introducing new words and repeating them, e.g. steeper"*
- *"recasting children's language when they make mistakes"*

The original aim was to include a second prompt, designed to elicit analytical procedural knowledge. However, examination of the largely open prompts used in previous research (e.g. Kersting, 2008; König et al., 2014), and pre-piloting work in the current study, indicated that eliciting rich interpretations of the video interactions

would result in a completion time of well over 30 minutes. This aspect was initially set aside for a second phase of work, to be completed once the empirical potential of the 'Strategy' and 'Use of Expert Term Scores' had been established. However, on review of responses, it was observed that a significant minority of respondents had (without prompting) provided an interpretation, most commonly a potential pedagogical intention (e.g. *"uses open questions to encourage conversation")* or an observed effect on children (e.g. *"repeats language modelled – child later uses new words").* These interpretations were credited to generate an **Analysis Score** for each vignette, theorised to indicate analytical procedural knowledge.

Thus, all three scores (Strategy, Use of Expert Term, Analysis) are derived from the same response. For example, the response *"uses descriptive commentary to model language – the child absorbs this and uses the words in her own speech"* would be credited as reflecting a **Strategy** (code 6), an **Expert Term** (descriptive commentary) and a degree of **Analysis** (the effect on the child). Given that teachers were not explicitly prompted to provide analyses, the Analysis Score must be interpreted with caution. Nonetheless, it can provide initial insight into the potential for capturing analytical knowledge in future iterations of the OLP.

Further details of the Strategy, Use of Expert Term and Analysis Scores, including a summary of their theoretical rationale, are provided in Table 2.4.

Table 2.4 Delineation of the Observing Language Pedagogy (OLP) Scores: Strategy, Use of Expert Term and Analysis

Facet of knowledge	OLP Item	Theoretical rationale
NOTICING/KNOWING HOW **Procedural knowledge** The ability to identify and enact pedagogical strategies salient for a specific context, adapting as appropriate. May be informal or tacit.	**STRATEGY SCORE** One score per video vignette, calculated by: 1. Assessing the (up to) 8 responses generated per video and assigning credit (0-1) for each reported strategy which matches one of the pedagogical strategies included in the OLP framework, using a detailed coding rubric (Section 2.7.1) 2. Weighting each coded strategy using an expert rating, reflecting the extent to which that strategy occurs in the vignette in an effective manner (Section 2.7.1) Together, these aspects reflect the *salience* of the strategies noticed by respondents. Credit can be awarded for strategies described in everyday language (e.g. *'how and why questions'* rather than *'open questions'*). Responses reflecting multiple techniques (as defined by the coding frame) can be credited as such, so the total strategies per video can exceed 8.	Expert teachers are better equipped to notice salient instructional moments (e.g Berliner, 1986, 1992). Although not all procedural knowledge captured will be tacit, the Strategy Score is designed to capture knowledge which may have developed implicitly or informally through classroom experience. Crediting strategies described in everyday language supports this aim.
ARTICULATING HOW **Explicit procedural knowledge** Explicit, formal and articulable knowledge of the pedagogical strategies which best support learning/ development.	**USE OF EXPERT TERMS SCORE** One score per video, reflecting the number of responses in which specific pedagogical terminology (e.g. recasting, open questions, meta-cognition, descriptive commentary) is used to describe a strategy or interaction. The terms credited are set out in the detailed coding framework (Section 2.7.2, Appendix 6). Range: 0-8 per video vignette	Experts are better equipped to notice salient moments and to notice with greater accuracy and detail (e.g Berliner, 1986, 1992). Those with greater explicit knowledge have a more extensive professional vocabulary with which they can articulate their knowledge, aiding deeper knowledge-processing and enabling them to articulate knowledge to others.
REASONING ABOUT HOW/WHY **Analytical procedural knowledge** Ability to reason about and interpret classroom situations, and select from a range of alternative strategies to achieve a specific pedagogical purpose and child outcome.	**ANALYSIS SCORE** One score per video, reflecting the number of responses in which an analysis or interpretation is provided, coded using a detailed coding framework (Section 2.7.3, Appendix 6). Range 0-8 per video vignette.	Expert teachers are better equipped to reason about and explain the potential purpose behind teaching interactions, to predict or reason about children's thinking/outcomes, and to make decisions based on their reasoning, including generating possible alternative approaches (e.g. Berliner, 1992; Bromme, 2001; Sabers, Cushing, & Berliner, 1991)

2.6 Pilot administration and sample

2.6.1 Survey administration

The Observing Language Pedagogy tool was piloted within an existing RCT designed to evaluate an oral language professional development programme. A total of 117 schools were participating in the trial at the time the current study took place: 60 in the intervention group and 57 in the control group. Five schools (2 intervention, 3 control) took part in the pre-test but withdrew prior to post-test. Although a true intention-to-treat design would include these schools, it was not possible to include them within the current study.

All participating schools were state-maintained primary schools, drawn from the 30% most disadvantaged areas of England as defined by the 2010 English Indices of Multiple Deprivation (Department for Communities and Local Government, 2011). Schools were located within three areas of England: the West Midlands, Liverpool and Manchester. All participating practitioners were in-service teachers of children aged 3 and 4 years, teaching either nursery (age 3) or reception (age 4).[4] Within each school, at least one nursery and one reception teacher participated in the RCT, with some larger schools taking three places. In all, teachers from 288 classes in 117 schools participated in the wider trial: an average of 2.5 teachers/classes per school. A small number (n=13) of additional non-classroom-based staff also participated, usually the Early Years Foundation Stage co-ordinator for the relevant school.

Since the intervention spanned two academic years, a number of teachers moved on and were replaced during the course of the RCT. The current study comprised teachers who were registered as trial participants at the time of the post-test (i.e. Autumn 2017), 67% of whom had been a participant since the start of the RCT. In all, 301 individuals from 117 schools received the OLP survey, primarily teachers leading participating classes.

The online survey was sent by email between November 2017 and January 2018. The emails were sent in batches, timed for schools to receive them shortly after the Environment Rating Scales observations being completed as part of the main trial. Up

[4] Within the English school system, both nursery and reception classes form part of the 'Early Years Foundation Stage'. The reception class represents the first year of primary schooling.

to two reminders per teacher were sent, and the survey was closed at the end of February 2018. The full text from both the email and survey are shown in Appendix 4.

Following reports that some teachers were collaborating to complete the survey (e.g. with other participating teachers in their school) an additional sentence was added to the survey text to make it clear that responses should be individual. There is no way of knowing how often collaborative completion occurred, but an informal check on the data indicates similarity in responses from 4 schools. This does not invalidate the relevant responses but should be borne in mind when interpreting the results as they do not strictly reflect the knowledge of individual teachers.

2.6.2 Sample

Responses were received from 104 teachers in 72 schools, reflecting a 62% response rate. Just under half of respondents (50 teachers, 35 schools) were in the intervention group. Three quarters had participated in the trial since the beginning, while one quarter had joined their school part-way through the trial.[5] This takes the design closer to intention-to-treat, testing the ability of the OLP to capture change in procedural knowledge in the context of varying degrees of participation. Of the 50 respondents from the intervention group, two thirds (66%) had attended five or six days of the six-day course, while 26% had attended two days or fewer (Table 2.5). The mean number of days attended by intervention group respondents was 3.5.

Table 2.5. Training days attended by intervention group respondents, of a 6-day course (n=50)

	0 days	1 day	2 days	3 days	4 days	5 days	6 days
N	4	2	7	2	2	5	28
%	8	4	14	4	4	10	56

Tables 2.6 and 2.7 show the characteristics of the individual respondents. The vast majority held Qualified Teacher Status (QTS), a graduate-level status enabling holders to work in state-maintained schools. One third (35%) had undertaken specialist early years teacher training rather than the more general primary-level training. Two were still working towards their teaching status. Approximately two-thirds taught 4-year-olds (i.e. reception) while just under one third were nursery class teachers, reflecting the fact that more reception-class teachers participated in the wider trial. Respondents

[5] Figures are 70% and 30% respectively for the intervention group only.

had an average of 11 years of teaching experience.[6] The majority of respondents worked in schools located in deprived areas, defined using the English Indices of Multiple Deprivation (IMD, 2010), with a mean ranking of 8,033 (where 1 represents the most deprived area in England and 32,482 represents the least deprived).

Table 2.6 Characteristics of respondents and their schools (n=104): frequencies[7]

	N	**%**
Gender		
Female	99	95.2
Male	5	4.8
Teaching qualification		
QTS Early Years 3-7	36	34.6
QTS Primary 3-11	61	58.7
Other: QTS Stage Unspecified	5	4.8
Other: Working towards QTS	2	1.9
Type of class		
Nursery class (3-4 years)	30	28.8
Reception class (4-5 years)	68	65.4
Other[8]	6	5.8
Intervention group membership		
Teachers within intervention group schools	50	48.1
Teachers within control group	54	51.9

Table 2.7. Characteristics of respondents and schools: descriptive data

	N	**Min**	**Max**	**Mean**	**S.D.**
Years of teaching experience	104	.5	33	10.7	7.6
Years of early years teaching experience	104	.5	33	8.2	7.0
IMD rank (geographic area in which respondents school was located) *1 = deprived, 32,482 = least deprived*	104	-	-	8,033.5	8,427.6

[6] An attempt was made to gather details of previous language-related professional development but the responses were of poor quality and difficult to interpret, so have not been used as part of the analysis.

[7] One of the 104 responses was a joint response from two teachers in an intervention group school (one nursery teacher and one reception class teacher). This was treated as one response for the purposes of analysis, rather than duplicating the response to generate one response per teacher. Both teachers had the same teaching qualification, and the mean of their reported years of teaching experience was taken. When linking to data on quality of provision, data from the reception class was used.

[8] 3 respondents working within early years units (combining nursery and reception classes), 1 combined response from the teachers together, 2 EY leads not responsible directly for a class

2.7 Developing and refining the coding framework (including interrater reliability)

A detailed framework for coding responses to the OLP tool was developed prior to administration by drawing on previous theory and research. The coding was designed to be as low-inference as possible to ensure accuracy and consistency. The framework was then refined using empirical responses from the pilot, and subjected to expert review. The expert review provided external validation for the content of the OLP framework; specifically, the pedagogical categories included within it. It also provided a means of weighting responses to reflect the extent to which respondents could identify the *most salient* pedagogical interactions within each vignettes. This use of expert benchmarking to provide a criterion reference is commonly accepted in similar measurement studies (e.g. Seidel & Stürmer, 2014). Four reviewers submitted ratings: a Professor of Psychology and Special Needs, a Professor of Educational Psychology and the Lead Speech & Language Advisor and Head of Evidence at a national charity specialising in speech and language support for young children. Together, these reviewers provided specialist understanding of both research and practice relating to oral language development.

The extent that multiple raters could apply the coding framework consistently was also assessed. A second coder was trained using a random sample of responses. The two raters coded a second random sample independently, to assess interrater consistency. This sample represented 35% of responses for the Strategy Scores, and 50% of responses for Use of Expert Term and Analysis Scores. Further refinements were made on the basis of the reliability exercise.

2.7.1 The Strategy Score

The framework for coding and assigning the Strategy Scores was based on the six pedagogical strategies identified in the literature review. Within each, a series of more specific strategies was delineated (again based on the literature) to create a framework totalling 26 strategies. While the high number of categories adds to the complexity of coding, this fine-grained delineation was necessary to allow responses to be weighted accurately based on the expert review.

Survey responses were then coded, revealing four additional strategies not reflected in the original framework (Table 2.8, Items 3, 14, 24 & 27). All were valid strategies, but

ones for which the literature review had shown somewhat weaker evidence of a direct link to oral language development (e.g. promoting children' self-worth).

The full list of 30 strategies was subjected to expert review, to gain an external perspective on which items should be in the final framework. Experts were provided with a summary of the strategies, including detail of the types of behaviours which might reflect each one, and asked to rate their importance for supporting oral language development (1=low, 5=high). The full instructions provided to reviewers are shown in Appendix 5, and the resulting ratings in Table 2.8.

Table 2.8 Detailed item delineation: pedagogical codes underlying the OLP Strategy Scores

Importance ratings based on all four experts; expert presence ratings excluding expert 4

	Expert Ratings			
	Import-ance (1=low 5=high)	**Expert presence within vignette…..** (1=low, 5=high)		
		…1	**…2**	**…3**
ADULTS MODELLING LANGUAGE FOR CHILDREN				
1. Modelling diverse, rich or specific *vocabulary* likely to extend the child	5.00	4.00	2.33	3.33
2. Modelling diverse, rich or specific *grammar* likely to extend the child	5.00	3.67	3.67	2.67
3. **ADDED:** Simple language modelling *(i.e. language which is appropriate and correct but which may not necessarily be diverse, rich or specific)*	3.50	4.00	4.67	4.67
4. Linguistic expansion or recasting of children's language	4.75	2.67	4.33	4.00
5. Emphasising, repeating or reinforcing language modelled for children	4.75	5.00	4.00	3.67
6. Using descriptive, informative & narrative language in concrete contexts	4.50	4.67	4.00	3.67
PROVIDING EXPLICIT INFORMATION ABOUT WORD MEANINGS				
7. Providing explicit definitions of words	4.00	2.33	1.00	2.00
8. Providing concrete clues to meaning *(e.g. gestures, pictures, props)*	4.00	4.00	4.00	3.33
FACILITATING COMMUNICATION AND CONVERSATION				
9. Engaging in conversation with children	5.00	4.00	4.67	4.67
10. Inviting communication: *non-verbal strategies*	4.75	3.67	4.67	4.67
11. Inviting communication: *verbal strategies*	4.75	4.33	4.67	5.00
12. Inviting communication: *vocabulary*	4.00	4.67	1.67	2.67
13. Being a responsive conversation partner	4.50	5.00	5.00	5.00
14. **ADDED:** Affirming the child's language by repeating it	3.25	4.67	4.67	4.00

15. Extending conversational or narrative content *(semantic extension)*	4.25	4.67	4.33	4.33
16. Supporting mutual understanding & adapting language to child's level	4.50	4.67	4.67	4.33
17. Supporting children to attend and participate	4.50	3.67	5.00	4.00
PROMOTING HIGHER ORDER LANGUAGE AND THINKING				
18. Promoting children's thinking	4.75	3.67	3.33	3.33
19. Prediction, speculation, reasoning, explanation and inference	3.75	4.67	3.67	3.67
20. Modelling fictional narrative *(prev. pretending, imagining, projecting)*[9]	3.75	2.33	2.67	4.67
21. Use of open questions	4.50	4.67	4.33	3.33
RELATIONSHIPS AND THE CHILD				
22. Positive affect or communication	4.00	4.67	5.00	5.00
23. Individual attention and sensitive responding	3.75	4.33	5.00	4.67
24. **ADDED:** Promoting children's self-worth	3.25	4.33	4.33	4.67
25. Using a non-directive approach	3.75	4.33	4.67	4.33
26. Facilitating peer communication	4.25	1.00	3.67	1.33
27. **ADDED:** Facilitating peer interactions and relationships	3.25	1.00	1.67	1.00
MEANINGFUL AND ENGAGING CONTEXTS FOR LANGUAGE-LEARNING				
28. Joint attention: following children's lead and interests	4.75	4.67	4.33	4.33
29. Providing meaningful and engaging contexts and activities for language	4.25	4.33	4.67	5.00
30. Deepening learning *(e.g. revisiting language across contexts, activities or curriculum areas)*	4.00	1.33	1.67	3.67

Mean importance ratings ranged from 3.25 to 5, with reviewers valuing most highly the modelling of diverse, rich or specific vocabulary and grammar, and engaging in conversation with children (strategies 1, 2 and 9). All three strategies with the lowest rating (3.25) were categories which had been added during the coding process: repeating children's language (Strategy 14), promoting children's self-worth (Strategy 24) and facilitating peer interactions and relationships (Strategy 27). However, given that none of the ratings could be described as low when using the full five-point scale, all thirty were included within the final framework.

[9] This item was previously entitled 'pretending, imagining and projecting'. However, it proved difficult to disentangle from other codes, particularly Strategy 15 Extending conversational content (for responses referencing the scaffolding of fictional narrative in Vignette 3) and Strategy 29 (for general references to pretending, storytelling, role play). The category was reduced in scope following the expert review, so expert ratings for this item may not be entirely accurate. In future iterations this item could be subsumed within others (e.g. added to Strategy 6).

The full OLP coding framework is shown in Appendix 6, including detailed guidance for coders on which responses to credit, and under which pedagogical strategy code. Detailed responses were generally straightforward to code. For example, *"introducing new words to extend children's vocabulary"* would be credited under Strategy 1 (modelling diverse, rich or specific vocabulary), *"being an active listener and responding to children"* would be coded under Strategy 13 (being a responsive conversation partner), and "*smiling and being welcoming to all children"* under Strategy 22 (positive affect or communication). Where respondents provided examples, these were used to support assignment to the relevant strategy code. For example, *"repeating words e.g. steeper slope"* clearly refers to an instance in Vignette 1 where the practitioner repeats her *own* words (i.e. Strategy 5) rather than to the repetition of *children's* words (i.e. Strategy 14).

By their nature, there is a good degree of overlap between the pedagogical codes. For example, the response "*modelling correct vocabulary for children"* could be coded under Strategy 3 (simple language modelling) or could refer to an instance of linguistic expansion (Strategy 4), whereby the practitioner extends the child's utterance by adding a word they have missed out, or modelling correct use of a term. The guidance was designed to allow coders to assign responses to a single category in the majority of cases, limiting the inference required by providing detailed coding rules. While this enabled the pulling-apart of complex and inter-connected pedagogies for measurement, it is also important to recognise the artificial nature of such an exercise. In reality, categories overlap to form a web of interconnected language-supporting practice.

When responses clearly reflect multiple techniques which fall with different pedagogy codes, double-coding can be applied (see coding framework for details). For example, *"introduces new words and uses gesture to explain their meaning"* would be coded under Strategy 1 and also under Strategy 8.

In some instances, responses were too brief to be assigned to a specific category. For example, the response "*repeating words"*, without an accompanying example as detailed above, could refer to the repeated modelling of words spoken by the adult (Strategy 5) or to the repetition of *children's* words (Strategy 14). While both reflect a valid pedagogical strategy, it is not possible to decide between categories with any

degree of accuracy. Such responses were coded to a separate 'non-specific' category. *"Questioning"* was the most common non-specific response*,* with more than 200 instances across the three vignettes. Where elaboration was provided, references to questions were coded accordingly, for example:

- *"modelling questions and sentence structure*" (Strategy 2)
- *"questions to encourage child to clarify"* (Strategy 11)
- *"missing word questions (is it faster or....)"* (Strategy 12)
- *"used purposeful questions to help develop a narrative"* (Strategy 15)
- *"questions the child to elicit understanding*" (Strategy 16)
- *"asking questions to extend child's thinking"* (Strategy 18)
- *"questioning to prompt and extend the child's explanations"* (Strategy 19)
- *"uses open questions"* (Strategy 20)

Non-specific responses without such clarifying detail were coded as such. A relatively small number of responses were considered too vague to award credit, even to the 'non-specific' category, and were coded as 0 (see full coding framework for details).

Interrater reliability for the strategy coding was good. Since multiple codes could be awarded for one response, agreement was calculated for each strategy code assigned by *either* rater, totalling 838 codes across the responses selected for the interrater exercise. Agreement between raters was 89% for Vignette 1, 88% for Vignette 2 and 82% for Vignette 3. Vignette 3 proved the most challenging to code reliably, particularly in relation to the use of story narrative and the use of multiple instructional contexts across the same vignette.

The final stage in generating the Strategy Scores for each vignette involved weighting each coded strategy using expert ratings of the extent to which each actually occurred in the vignette in an effective manner. The aim was to ensure that scores reflected the *salience* of strategies noticed by respondents within each video interaction, rather than simply the number of strategies they were able to list. The four reviewers were given the three vignettes and accompanying transcripts. For each vignette, they were asked to rate the extent that each of the 30 pedagogical strategies were present, and reflected an example of expert language-supporting practice. The full instructions provided to reviewers are shown in Appendix 5, and the resulting ratings in Table 2.8.

All strategies were judged to be present in the vignettes to some degree, although the degree of expert practice varied, offering valuable discriminatory potential. For example, while all three practitioners were considered to be skilled responsive conversation partners (Strategy 13), ratings were relatively low for Strategy 7 'providing explicit definitions of words'. The expert ratings also showed evidence of discrimination between vignettes. For example, only the practitioner in Vignette 1 was considered to be actively encouraging children's vocabulary use (Strategy 12).

It should be noted that there was a considerable degree of variation in the expert ratings. Ratings of 'importance' were highly reliable, with an average weighted kappa statistic (Cohen, 1968)[10] of .89, indicating excellent agreement (Landis & Koch, 1977; Fleiss, 1981). However, expert reliability for the 'expert presence' ratings was much lower (.29), perhaps reflecting the challenging nature of rating 30 items for each vignette. One expert omitted approximately 40% of the ratings and displayed low levels of agreement with other raters on the remaining items. When the ratings of this expert were excluded, the average weighted kappa statistic for 'expert presence' was .48, indicating moderate agreement.

The final Strategy Scores were calculated using the mean 'expert presence' ratings of the three experts who completed the full review. That is, if a listed strategy reflected an allowable response for a pedagogical code, it was awarded the mean expert presence rating for that code. So, for example, the response *"uses open questions to encourage communication"* to Vignette 1 would be coded under Strategy 21 and awarded a score of 4.67 (see Table 2.8). A response reflecting two valid pedagogical codes would be awarded the summed expert presence ratings for both codes. For example, *"listening to the child and valuing all her ideas"* in response to Vignette 1 would be coded under Strategy 13 and also under Strategy 24, and awarded a score of 9.33 (5.00 plus 4.33). A full coding illustration is shown in Table 2.11.

As noted, all 30 pedagogical codes were used, on the basis that variations in importance were reflected in the expert weighting. An alternative approach would

[10] The kappa statistic (Cohen, 1960) reflects the extent of agreement between two raters, over and above that which could be expected by chance alone. Weighted kappas refine this measure by taking into account the *extent* of disagreement between raters. One of the pre-recorded weights within the statistical package Stata was used (the option which most heavily weighted close agreement). Using a 5-point scale, perfect agreement is weighted 1, a disagreement of 1 is weighted .94, a disagreement of 2 is weighted .75, a disagreement of 3 is weighted .44 and a disagreement of 4 is weighted 0.

have been to exclude strategies which received the lowest importance ratings (e.g. < 3.5). This is tested further in Section 3.4.5, which explores the extent to which the expert weightings improved the predictive validity of the OLP. Responses coded as non-specific were not included, since it was not possible to assign an expert weighting.

Given the application of the expert weightings, and the possibility of double-coding some responses, it is difficult to establish a precise range for the Strategy Score. In practice, the number of strategies awarded for any one vignette ranged from 0 to 15 and, once the expert ratings were applied, the weighted Strategy Scores ranged from 0 to 64.68 (see Table 3.1).

2.7.2 Use of Expert Terms Score

The Use of Expert Term Scores were generated by calculating the number of responses in which specific pedagogical terminology (e.g. recasting, open questions) was used to describe a strategy or interaction,[11] resulting in a range of 0-8 per video vignette. The words and phrases credited as representing an 'expert term' were defined prior to coding, refined following coding, and then subjected to expert review by two of the four reviewers. Terms were included when identified by at least one reviewer.[12] Table 2.9 presents the expert terms credited, alongside their informal equivalents. At least one expert term was identified for the overarching strategies of: modelling language; providing explicit information about word meanings; facilitating communication and conversation; and promoting higher order language and thinking. No terms were identified relating to relationships and the child; or to meaningful and engaging contexts for language-learning. Analysis of survey responses indicated that, for the pilot sample, the most commonly cited expert term was open questions (45%), followed by commentary-related terms (32%), recasting (9%) and scaffolding (7%). Interrater reliability for the Expert Term Score was 100%.

[11] In contrast to the Strategy Score, the Use of Expert Term Scores included responses coded as non-specific.
[12] Including only terms validated by both reviewers would have been more robust. However, this resulted in a pool of terms too small to support useful measurement.

Table 2.9 Expert terms credited

Strategy code	Examples of informal descriptions	Expert term/s credited
ADULTS MODELLING LANGUAGE FOR CHILDREN		
4. Linguistic expansion or recasting of children's language	• repeating back what the child says using the correct language • extending child's language and adding detail	• recasting *(child's language etc)*
6. Using descriptive, informative & narrative language in concrete contexts	• talking about what the child is doing • commenting • explaining • describing	• descriptive commentary • running commentary/ narrative • self-talk • commentary/ commentating
PROVIDING EXPLICIT INFORMATION ABOUT WORD MEANINGS		
7. Providing explicit definitions of words	• explaining the meaning of words	• providing definitions of words
FACILITATING COMMUNICATION AND CONVERSATION		
11. Inviting communication: *verbal strategies*	• why/how questions • yes/no questions	• open questions • closed questions
12. Inviting communication: *vocabulary*	• leaving a gap for the child to fill in the blanks • incomplete phrases to complete with the missing word	• completion prompts
PROMOTING HIGHER ORDER LANGUAGE AND THINKING		
18. Promoting children's thinking	• talking about thinking • modelling thinking/thought processes	• meta-cognition • pole bridging
18. Promoting children's thinking	• supporting children's thinking • helping child think through a problem	• sustained shared thinking
GENERAL TERMS USED WITHIN MULTIPLE CATEGORIES		
Scaffolding language	• continuing, supporting or extending language, conversation or narrative	• scaffolding *(language, conversation etc)*

2.7.3 Analysis Score

The Analysis Score was generated by calculating the number of responses within each vignette for which a credible interpretation or analysis was provided, resulting in a score range of 0-8 per vignette. Three categories of interpretation were coded:

- references to a possible pedagogical intention;
- references to an observed effect on children resulting from the teacher's actions;
- references to inferred pedagogical decision-making or to an alternative strategy which could have been used.

The coding frame set out potential interpretations for techniques listed within each OLP strategy code.[13] An illustration is shown in Table 2.10 below, and the full guidance in Appendix 6.

Interrater reliability was calculated for all responses with a strategy cited: agreement was 96% for Vignette 1, 98% for Vignette 2 and 96% for Vignette 3. Given that interpretations were not explicitly prompted, findings for the Analysis Score should be interpreted with caution. Nonetheless, they provide insight into the potential for capturing analytical knowledge in future OLP iterations.

2.7.4 Coding illustration

As a final illustration, Table 2.11 below shows a full set of example responses to Vignette 1, coded for Strategy, Use of Expert Terms and Analysis, resulting in:

- a Strategy Score of 46.68 *(highest score for this sample 64.68)*
- a Use of Expert Term Score of 2 *(full potential range 0-8)*
- an Analysis Score of 2 *(full potential range 0-8)*

[13] Although interpretations relating to strategies within the non-specific category would technically have been allowed, in practice the brief nature of these responses meant that this did not occur.

Table 2.10 Extract from OLP coding framework: Analysis Score STRATEGY 21 - Open questions

Coding guidance for responses citing a possible pedagogical intention		**Example response identifying effect on children**	**Example response referencing decision-making**
Examples of valid techniques	**Valid pedagogical intentions**		
Open questions… Asking/ using open questions…	• …to encourage, initiate, promote, prompt, develop, invite or 'be a magnet for' communication/ interaction/ response • …to initiate, create, create a culture of, begin, spark or engage children in conversation • …to encourage the child to describe, clarify, articulate, provide further information etc • …to scaffold or model conversation (skills)/as a conversation strategy • …to extend/develop child's talk, language or narrative skills • …to provide an opportunity for child to show understanding **DO NOT CREDIT:** • …to communicate • …to extend (the child) • …to extend the activity/play • …to promote language **CODE ELSEWHERE** • …to promote thinking, learning, understanding (Strategy 18) • …to encourage the child to explain (Strategy 19)	*"She asks an open question, which encourages the child to respond and broaden his thoughts about breakfast"*	*"She used an open rather than a closed question, to promote the child to give a longer answer"*

Table 2.11 Example set of responses for Vignette 1, coded for Strategy, Expert Terms and Analysis

Responses	**Strategy code/s assigned**	**Strategy** Ref: expert weighting from Table 2.8	**Expert Terms (Bold)**	**Analysis** *(Italics)*
"modelling vocabulary e.g. cuboid"	3: Simple modelling of language	4.00		
"extending the child's grammar by introducing comparatives and repeating them"	2: Modelling diverse, rich or specific grammar likely to extend the child 5: Emphasising, repeating or reinforcing language modelled for children	3.67 5.00		1
"making comments and extending children's responses"	11: Inviting communication: *verbal* 4: Linguistic expansion or recasting of children's language	4.33 2.67		
"running commentary on child's actions"	6: Using descriptive, informative & narrative language in concrete contexts	4.67	1	
"repeating the child's words *to confirm and give feedback"*	14: Affirming the child's language by repeating it	4.67		1
"eye contact"	10: Inviting communication: *non-verbal*	3.67		
"listening to child and valuing all her ideas"	13: Being a responsive conversation partner 24: Promoting children's self-worth	5.00 4.33		
"uses **open questions** "	21: Use of open questions	4.67	1	
	Total for this vignette	**46.68**	**2**	**2**

In all, nine OLP scores were generated for initial analysis: three Strategy Scores, three Use of Expert Term Scores and three Analysis Scores (i.e. one of each score per vignette). These scores combine or 'parcel' the (up to) eight responses generated in response to each vignette. An alternative would have been to use the individual responses as the unit of analysis (i.e. up to 8 per vignette, up to 24 in total). Following the approach taken by Jamil et al. (2015), the decision to parcel responses was taken to reduce the number of analysis variables, and to limit problems arising from the non-normal distribution of dichotomous data (Bandalos, 2002). This means that the OLP scores, although similar to test items, are not items in the traditional sense because they derive from the same set of teacher responses (Kersting, 2008).

The nine scores are theorised to form three separate but related pedagogical knowledge factors:

1. noticing/knowing how (procedural knowledge) – Strategy Scores
2. articulating how (explicit procedural knowledge) – Use of Expert Term Scores
3. reasoning about how/why (analytical procedural knowledge) – Analysis Scores

Two alternative two-dimensional constructs could be predicted:

- noticing/knowing/articulating how (Strategy Scores + Expert Term Scores) and reasoning about how/why (Analysis Scores);
- noticing/knowing how (Strategy Scores) and explicit knowledge (Expert Term Scores + Analysis Scores).

Finally, it is possible that the OLP scores are best described by a one-factor model reflecting procedural pedagogical knowledge. All four options are tested in Chapter 3, which explores the psychometric properties of the OLP.

CHAPTER 3: FINDINGS - TESTING PSYCHOMETRIC PROPERTIES

This chapter covers the remaining stages of Viswanathan's (2010) framework: reliability testing, dimensionality testing, convergent validity and preliminary validation.

3.1 Data characteristics

3.1.1 OLP knowledge scores

A check for missing data revealed that, whilst all background teacher/school variables were complete, a small number of teachers failed to respond to all three video vignettes. Three sets of responses (2.9%) were missing for Vignette 2, and seven for Vignette 3 (6.7%). Little's MCAR Test[14] indicated no statistically significant patterns in the missing data (p=.22). A conservative approach to imputation was nonetheless considered appropriate: the p value was relatively small, and low levels of 'missingness' meant that conditional imputation would rely on a small number of variables in each condition. The majority of analyses were thus completed on the original sample, but checked for robustness using full information maximum likelihood (FIML), on the basis of arguments favouring FIML over multiple imputation (MI) (e.g. Allison, 2012). Although MI and FIML make similar assumptions and have similar statistical properties, Allison argues that FIML is simpler. It produces a deterministic result, whereas MI (by nature) produces a different result for each imputation, generating the question of 'how many imputations are enough?' In addition, the use of a single model overcomes the need within MI for the imputation and analysis models to be as closely matched as possible (e.g. if the analysis model includes interaction terms, the imputation model should also include interaction terms).

Table 3.1 below presents descriptive statistics for the OLP Strategy, Expert Term and Analysis Scores for the sample as a whole, and separately for the control group (representing a non-intervention sample). Details of data distributions are shown in Table 3.2 and Figure 3.1.

[14] Based on all teacher and school characteristics shown in Tables 2.6/2.7, observed quality of provision (all individual ERS item scores, excl. ECERS-3 Item 37, which many non-applicable values), and the individual OLP Strategy, Use of Expert Term and Analysis Scores for each vignette.

Table 3.1 Descriptive statistics for OLP variables

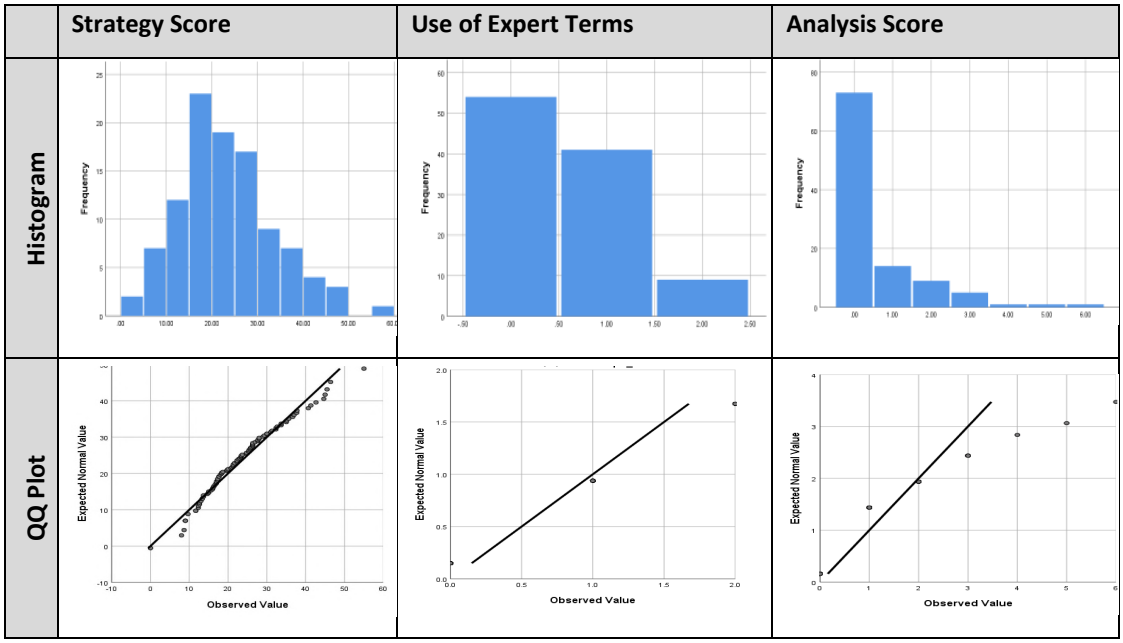
	Vignette 1				Vignette 2				Vignette 3			
	% >0	Range	Mean	S.D.	% >0	Range	Mean	S.D.	% >0	Range	Mean	S.D.
Whole sample (n=104/101/97)												
Strategies (unweighted)	98	0-13	5.5	2.5	99	0-10	5.0	2.2	99	0-15	5.4	2.5
Strategy Score (weighted)	98	0-55.0	23.0	10.3	99	0 – 41.7	20.7	9.0	99	0-64.7	21.7	10.3
Use of Expert Terms	48	0-2	.6	.7	31	0-2	.40	.65	34	0-2	.4	.6
Analysis Score	30	0-6	.6	1.2	31	0-6	.53	1.0	37	0-7	.9	1.5
Control group (n=54/54/45)												
Strategies (unweighted)	96	0-13	5.1	2.7	98	0-9	4.5	2.15	98	0-12	4.89	2.3
Strategy Score (weighted)	96	0-55.0	21.3	11.1	98	0-38.0	18.5	8.96	98	0-49.7	19.4	8.9
Use of Expert Terms	44	0-2	.5	.6	19	0-1	.2	.39	31	0-1	.3	.5
Analysis Score	27	0-6	.5	1.1	30	0-4	.5	.88	37	0-5	.7	1.2
Intervention group (n=50/47/45)												
Strategies (unweighted)	100	3-11	5.9	2.1	100	2-10	5.5	2.1	100	2-15	6.0	2.6
Strategy Score (weighted)	100	11.7-45.0	24.9	9.0	10	6.3-41.7	23.3	8.5	100	6.0-64.7	24.4	11.1
Use of Expert Terms	52	0-2	.7	.7	45	0-2	.6	.8	38	0-2	.4	.6
Analysis Score	32	0-5	.7	1.2	31	0-6	.6	1.2	38	0-7	1.1	1.8

Table 3.2 Normality of distribution of OLP Scores

Skewed and/or kurtotic variables identified **(+)** based on z-scores >3.29 for samples 50-300 (Hae-Young, 1996)

	Skew	S.E	Z-score	Kurtosis	S.E	Z-score
Strategy Score						
Vignette 1 (n=104)	.54	.24	2.28	.35	.47	.75
Vignette 2 (n=101)	.12	.24	.49	-.53	.48	-1.12
Vignette 3 (n=97)	1.06	.25	**4.32+**	2.42	.49	**4.98+**
Use of Expert Terms						
Vignette 1	.72	.24	3.03	-.50	.47	-1.06
Vignette 2	1.40	.24	**5.84+**	.74	.48	1.56
Vignette 3	1.12	.25	**4.57+**	.27	.49	.56
Analysis Score						
Vignette 1	2.39	0.24	**10.09+**	6.34	0.47	**13.50+**
Vignette 2	2.76	0.24	**11.51+**	9.64	0.48	**20.25+**
Vignette 3	1.93	0.25	**7.89+**	3.46	0.49	**7.13+**

Figure 3.1 Histograms and QQ plots for Vignette 1 scores (see Appendix 7 for Vignettes 2 and 3)



Looking first at the Strategy Codes before the expert weightings were applied (Table 3.1), the vast majority of respondents identified at least one codeable strategy for each vignette completed, with a mean of approximately five strategies per vignette. Applying the expert weightings to create the Strategy Scores increased the mean to just above 20 for each vignette. Broad ranges and varied score distributions indicate potential for useful measurement. The Strategy Scores displayed largely normal

distributions, with scores for Vignette 3 showing a degree of skewness and kurtosis due to an outlier.

Although the ranges for the Use of Expert Term and Analysis Scores were considerably narrower, they did display some variation. Given that the eventual aim is to combine scores across vignettes, this may be adequate to support discrimination between respondents. No outliers were identified for the Use of Expert Term Scores. For the Analysis Scores, the majority of respondents scored 0, 1 or 2, with respondents scoring 3 or more identified as outliers.

Given the relatively few respondents who provided an interpretation, simply removing outliers could both introduce significant bias and exclude valuable data. Instead, Winsorisation was used, in which outlying cases are replaced with the value at a defined upper threshold (Dixon, 1960; Tukey, 1962). The upper threshold was specified using the interquartile range.[15] For the Strategy Score, only one case was Winsorised; and for the Analysis Score all values over 2 were replaced with 2.5.[16] Analysis was conducted using the original data but checked with Winsorised outliers, to guard against bias.

Means for the Use of Expert Term and Analysis Scores were considerably lower than means for the Strategy Scores. This was because a sizeable proportion of respondents in each case scored zero, resulting in a positive skew for many variables (Table 3.2/Figure 3.1 above). Some will be true zeros while others (particularly for the Analysis Score) will reflect respondents capable of providing a valid response, had they been directly prompted and/or had greater opportunities to do so. Although variables with a high proportion of zero values *can* be transformed (e.g. using a log+1 transformation) there is a strong case for applying analysis techniques appropriate for data-type and characteristics, rather than attempting to 'fix' distributions (O'Hara & Kotze, 2010).

The OLP scores present in many ways as count data; that is, as non-negative integer data reflecting the number of times an event (e.g. use of an expert term) takes place.

[15] Outliers identified using the Interquartile Range (IQR) with the higher limit defined as $Q_3 + 1.5*IQR$, where Q_3 is the 75th percentile.
[16] Strategy Scores: V3 (1 case replaced, Winsorised mean=21.60); Analysis Scores: V1 (8 cases replaced, Winsorised mean =.50), V2 (4 replaced, Wins. mean=.46), V3 (16 replaced, Wins. mean=.67).

Count data are often zero-inflated and positively skewed. However, the OLP Scores reflect more than simple event counts. The number of strategies, expert terms and interpretations reported by study participants are theorised to reflect a *continuous* underlying construct (i.e. procedural pedagogical content knowledge). It may therefore be more accurate to describe them as censored continuous variables. Such variables assess continuous constructs, but include values which may not reflect the true value on the number line, due to limitations on measurement opportunities (Grace-Martin, n.d).

Due to the design of the OLP, only a limited number of values are possible for the scores. Had they been provided with additional vignettes to complete, respondents may have reported additional strategies, expert terms or interpretations - resulting in a greater spread of possible values or values above the current possible range. At the lower limit, scores are bounded at zero, with the Use of Expert Term and Analysis Scores both displaying a large proportion of null values.

A further important characteristic to note is that the Strategy, Use of Expert Term and Analysis Scores were not generated entirely independent of each other: expert terms and interpretations can be applied only when a strategy has been identified.

The analysis strategy was designed to take these characteristics into account, where possible, and is presented in Section 3.2.

Finally, Table 3.3 (below) presents a breakdown of the pedagogical codes which underlie the Strategy Scores. The most commonly awarded codes were those relating to adults modelling language for children: responses coded under Strategies 1, 3, 4 and 6 were reported by more than 50% of respondents across the three vignettes. Strategies 8 (concrete clues to meaning), 13 (engaging in conversation) and 29 (meaningful/engaging contexts) were also identified by more than half of all respondents.

Other codes were assigned less frequently; for example, codes 17 (supporting attendance/ participation) and 25 (non-directive approach) were assigned by 10% of respondents or fewer. In the next iteration of the OLP it may be possible to combine some categories to reduce the coding complexity. However, there is also a good

theoretical argument for retaining the structure, despite low assignment, where pedagogical strategies are evidence-based and distinct conceptually from each other.

Table 3.3 Assignment of OLP pedagogical codes across all three vignettes (n=104)[17]

	Min	Max	Mean	S.D.	Assigned
ADULTS MODELLING LANGUAGE FOR CHILDREN					
1. Modelling diverse, rich or specific *vocabulary* likely to extend the child	0	4	1.08	1.09	67 (64%)
2. Modelling diverse, rich or specific *grammar* likely to extend the child	0	4	0.49	0.88	31 (30%)
3. Simple language modelling (i.e. language which is appropriate and correct but which may not necessarily be diverse, rich or specific)	0	5	1.24	1.19	67 (64%)
4. Linguistic expansion or recasting of children's language	0	4	0.91	1.12	51 (49%)
5. Emphasising, repeating or reinforcing language modelled for children	0	4	0.38	0.78	28 (27%)
6. Using descriptive, informative & narrative language in concrete contexts	0	4	1.25	1.04	72 (69%)
PROVIDING EXPLICIT INFORMATION ABOUT WORD MEANINGS					
7. Providing explicit definitions of words	0	2	0.27	0.58	21 (20%)
8. Providing concrete clues to meaning (e.g. gestures, pictures, props)	0	3	0.72	0.82	55 (53%)
	Min	**Max**	**Mean**	**S.D.**	**Assigned**
FACILITATING COMMUNICATION AND CONVERSATION					
9. Engaging in conversation with children	0	3	0.23	0.67	13 (13%)
10. Inviting communication: *non-verbal strategies*	0	4	0.75	1.10	43 (41%)
11. Inviting communication: *verbal strategies*	0	6	0.72	1.15	39 (38%)
12. Inviting communication: *vocabulary*	0	4	0.13	0.48	11 (11%)
13. Being a responsive conversation partner	0	6	1.03	1.25	55 (53%)
14. Affirming the child's language by repeating it	0	3	0.46	0.81	30 (29%)
15. Extending conversational or narrative content (semantic extension)	0	3	0.40	0.72	31 (30%)
16. Supporting mutual understanding & adapting language to child's level	0	3	0.26	0.59	20 (19%)
17. Supporting children to attend and participate	0	2	0.08	0.33	6 (6%)

[17] For respondents with missing data, pedagogical codes are based on responses from vignettes completed

PROMOTING HIGHER ORDER LANGUAGE AND THINKING					
18. Promoting children's thinking	0	4	0.57	0.96	32 (31%)
19. Prediction, speculation, reasoning, explanation and inference	0	2	0.24	0.51	21 (20%)
20. Modelling fictional narrative (prev. pretending, imagining, projecting)	0	1	0.18	0.39	19 (18%)
21. Use of open questions	0	3	0.58	0.92	37 (36%)
RELATIONSHIPS AND THE CHILD					
22. Positive affect or communication	0	3	0.15	0.48	12 (12%)
23. Individual attention and sensitive responding	0	3	0.38	0.77	24 (23%)
24. Promoting children's self-worth	0	5	0.59	0.94	38 (37%)
25. Using a non-directive approach	0	1	0.08	0.27	8 (8%)
26. Facilitating peer communication	0	2	0.11	0.34	10 (10%)
27. Facilitating peer interactions and relationships	0	2	0.20	0.49	17 (16%)
MEANINGFUL AND ENGAGING CONTEXTS FOR LANGUAGE-LEARNING					
28. Joint attention: following children's lead and interests	0	3	0.49	0.74	39 (38%)
29. Providing meaningful and engaging contexts and activities for language	0	4	0.90	1.09	55 (53%)
30. Deepening learning	0	4	0.48	0.79	35 (34%)
OTHER					
Responses coded as non-specific	0	11	3.74	2.74	94 (90%)

3.1.2 Clustered nature of the data

As 57% of respondents were from schools with multiple respondents (Table 3.4), it was necessary to consider the clustering of data points within schools. There are a number of possible reasons why the knowledge scores of teachers from the same school might be more similar than those of teachers from different schools, including school factors (e.g. common professional development), intervention factors (e.g. collaboration during the intervention) and study factors (e.g. joint completion of the OLP survey).

Intra-class correlations (ICCs) were estimated for the each OLP score (Table 3.5). This method is not ideally suited to the skewed Use of Expert Term and Analysis Scores and, in fact, three computations failed to run. Nonetheless, the ICCs provide a broad sense of likely associations and, where analysis was possible, indicated that within-school clustering should be accounted for.

Table 3.4 Number and proportion of respondents from schools with multiple respondents

	Schools with single response	Schools with 2 respondents	Schools with 3 respondents	Total
Number of respondents	45	44	15	**104**
Percentage of respondents	43.3%	42.3%	14.4%	**100%**

Table 3.5 Intra-class correlations between OLP Knowledge Scores

	Vignette 1	Vignette 2	Vignette 3
Strategy Score	29.37%	40.59%	15.19%
Use of Expert Terms	-	24.58%	-
Analysis Score	-	24.64%	5.34%

Within-school associations were addressed largely through using school-level clustered robust standard errors in structural equation modelling and linear regression analyses (see Section 3.2). Multi-level modelling was considered but rejected, on the basis that more than 40 per cent of schools had only one respondent.

For analyses using OLP scores to predict observed quality of practice, a slightly different approach was taken because only one Environment Rating Scales observation had been conducted per school. Rather than use clustered robust standard errors, a school-level data set was generated comprising classroom per school (n=72). Further detail is provided below.

3.1.3 Quality of practice

Data were available from the wider RCT on observed quality of practice in one reception classroom per school, conducted using the research-validated Environment Rating Scales (ERS):

- **ECERS-3** assesses the pedagogical, socio-emotional and care environments provided for children aged from 3-5 years (Harms, Clifford & Cryer, 2014);
- **ECERS-E** provides additional items to assess curricular provision, including support for emergent literacy, mathematics and scientific thinking (Sylva, Siraj & Taggart, 2003);
- **SSTEW** focuses on high-level interactions designed to support children's thinking skills, language, emotional well-being and self-regulation (Siraj, Kingston & Melhuish, 2014) and is appropriate from two-to-five years.

Each ERS scale comprises items evaluating different aspects of practice (Appendix 8). Within each item, observers complete a series of behavioural indicators and use a metric - based on the number of indicators completed - to assign a score from 1 (inadequate) to 7 (excellent), thus creating a measurable profile of quality across different dimensions. An overall score is generated using the mean of item scores.

ERS items are technically ordinal in nature because they derive from quality ratings. However, as they have more than five categories, a case can be made for treating them as continuous (or, more accurately, as ordinal approximations of a continuous variable) without detriment (Johnson & Creech, 1983; Norman, 2010; Sullivan & Artino, 2013; Zumbo & Zimmerman, 1993; Williams, 2018). This approach is particularly defendable when ordinal items (e.g. ERS items) are combined to form an overall sum or mean. As Pasta notes, while critics complain that we do not know whether ordinal categories are equally spaced, *"we also don't 'know' that the relationship between continuous variables is linear, which means we don't 'know' that a one-unit change in a continuous variable has the same effect no matter whether it is a change between two relatively low values or a change between two relatively high values"* (Pasta, 2009 pp.2-3).

External observations were conducted in all schools pre- and post-intervention, using the full ECERS-3 and SSTEW and the literacy subscale of the ECERS-E. Although multiple teachers participated per school, only one reception class per school was observed. This single observation was taken to represent quality of provision within the Early Years Foundation Stage (EYFS) for each participating school. The OLP was administered shortly after the ERS post-test in each school: the ERS assessment period was October to early December 2017, and the OLP completion period from early November 2017 to the end of February 2018. Just over half (55) of the 104 teachers who responded to the OLP survey were from observed reception classes. For the remaining respondents, the ERS data reflect a more distal measure of EYFS quality within their school, rather than in their own classroom. For all ERS analyses, a school-level dataset was generated (n=72) based on over-selection of teachers whose classes had been observed, to maximise potential relationships between teacher knowledge and observed quality of practice - whilst also addressing issues arising from intra-school correlations.[18]

[18] Within the school-level quality dataset (n=72), 74% (n=53) were reception teachers whose class had been observed. For the remaining 26% of teachers (n=19), the quality data reflected EYFS quality within their school more

The ERS cover a broad range of quality dimensions, including aspects relating to the physical environment, personal care routines (e.g. toileting) and support for different aspects of learning and development (e.g. maths, fine and gross motor development). In order to generate a more targeted quality measure, items relating specifically to language-supporting practice were selected across all three Environment Rating Scales. Ideally, items would have been identified by including all ERS items within one factor analysis, and establishing whether a coherent oral-language-supporting construct emerged from the data. However, the number of items (55 across the three scales) was too large for inclusion in one model. Instead, the ten items which most clearly reflected language-supporting practices identified in the literature review were selected based on face-validity (Table 3.7 below; Appendix 8).

A confirmatory factor analysis (CFA) was conducted on this reduced set of items in the RCT dataset to confirm whether it formed, as predicted, a coherent latent construct - reflecting quality of language-supporting practice (Schreiber et al., 2006). Factor loadings ranged from .43 to .84, and the model fit (Table 3.6) was moderate.

Table 3.6 Creating the ERS Oral Language Factor: goodness-of-fit statistics

	10-item model , full RCT dataset (n=117)	**7-item model, full RCT dataset (n=117)**	**7-item model, study dataset (n=72)**	**Fit criterion** Parry (n.d), Schreiber et al., (2006)
Chi squared (χ^2)*	χ^2 (35) = 71.92 p= 0.00	χ^2 (14) = 19.45 p=.15	χ^2 (14) = 16.85 p=.26	>.05 (Parry)
Root Mean Square Error of Approximation (RMSEA)	.10	.06	.05	<.06 - <.08 (Schreiber) <.08 (Parry)
Comparative Fit Index (CFI)	.94	.99	.99	≥.90 (Parry) ≥.95 (Schreiber)
Tucker Lewis Index (TLI)	.92	.99	.99	≥.95 (both sources)
Standardised Root Mean Square Residual (SRMR)	.06	.03	.03	<.08 (both sources)

* The χ^2 statistic tests the null hypothesis that the CFA model being tested does not differ significantly from the saturated model. The saturated model reflects the best possible fit to the data, as it perfectly reproduces all variances, covariances and means. A non-significant result means that the tested model does not differ significantly from the saturated model and the null hypothesis is not rejected: thus, the model fit is good.

broadly. Of these, 19 per cent (n=14) were unique (non-observed) respondents from their school. In the 4% of schools (n=3) with two non-observed respondents, the reception-class teacher or early years lead was selected over the nursery teacher, on the basis that the ERS data reflected reception class practice. Finally, in 3% of schools (n=2), the observed teacher had missing OLP data. In these two schools, the non-observed teacher was selected for the school-level dataset on the basis of maximising non-missing OLP data.

Table 3.7 Creating the ERS Oral Language Factor: coefficients for the seven-item model

Study school-level sample (n=72), items crossed through are the three removed from the original ten-item model

Scale	Item	β	B	S.E.	Link to OLP pedagogical framework
~~ECERS-3~~	~~12 Helping children expand vocabulary~~				• ~~Adults modelling language for children~~ • ~~Explicit information about word meanings~~
ECERS-3	30 Staff-child interactions	.83	1.0	-	• Relationships and the child
~~SSTEW~~	~~2. Encouraging choices/independent play~~				• ~~Meaningful and engaging contexts~~
SSTEW	5. Encouraging children to talk with others	.90	.85	.09	• Adults modelling language for children • Facilitating communication & conversation • Relationships and the child • Meaningful and engaging contexts
SSTEW	6 Staff actively listen to children and encourage children to listen	.83	.97	.11	• Facilitating communication & conversation • Promoting higher order language & thinking
SSTEW	7 Staff support children's language use	.76	.75	.10	• Adults modelling language for children • Facilitating communication & conversation
SSTEW	8 Sensitive responsiveness	.82	.85	.10	• Facilitating communication & conversation • Relationships and the child
~~SSTEW~~	~~10 Encouraging SST through storytelling, sharing books, singing and rhymes~~				• ~~Facilitating communication & conversation~~ • ~~Promoting higher order language & thinking~~ • ~~Meaningful and engaging contexts~~
SSTEW	12 Supporting children's concept development and higher-order thinking	.73	.61	.09	• Promoting higher order language & thinking
ECERS-E	6 Talking and listening	.80	.69	.09	• Facilitating communication & conversation • Promoting higher order language & thinking

The ERS items with the lowest factor loadings (.43-.66) were removed, with the dual aim of improving model fit and generating a smaller set of items which could reasonably be re-tested using CFA within the smaller study dataset of 72 schools. The goal was to identify the smallest set of items which - to some degree - represented the six overarching pedagogical categories represented in the OLP framework (Table 2.8).

The best-fitting model comprised seven ERS items, none of which directly addressed the provision of explicit information about word meanings: however, all other OLP categories were represented. The final set of items, and the three removed, are shown in Table 3.7. The fit for the resulting seven-item model was good, both for the full RCT dataset and the study dataset (Table 3.6) and factor loadings were all above .73 (Table 3.7). An ERS Oral Language factor score was created by weighting scores using factor loadings.

All analyses were also conducted using the overall ECERS-3 and SSTEW scores to establish the extent to which the OLP predicted general quality of practice. Finally, a factor comprising three ECERS-3 items relating to support for mathematical development was created to provide a test of discriminant validity, on the basis that a measure of language knowledge (i.e. the OLP) should not relate strongly with mathematical practice (see Appendix 8).

Descriptive statistics for the ERS quality variables are shown in Table 3.8 below. Observed quality of practice was generally low overall, with mean scores on the 7-point ERS scale ranging from 1.29 to 2.94 (where 1=inadequate, 3=minimal, 5=good, 7=excellent). There was nonetheless some variation in scores, enabling associations with the OLP to be tested. The ERS variables displayed largely normal distributions with no problematic outliers. Schools in the study sample were broadly representative of the 117 schools taking part in the wider RCT (see Appendix 8). Associations between the Oral Language Factor, the overall ECERS-3 and the overall STTEW scores were high (.81-.95) but did show some variation (Table 3.9). As expected, associations with the ERS maths factor were generally lower.

Table 3.8 Descriptive statistics for ERS variables in the study dataset (school-level sample, n=72)

Skewed and/or kurtotic variables identified **(+)** based on z-scores >3.29 for samples 50-300 (Hae-Young, 1996)

	Min (1-7)	Max (1-7)	Mean (1-7)	S.D.	Skew	S.E.	Z-score	Kurt-osis	S.E.	Z-score
ERS Oral Language Factor	.91	5.10	2.91	1.07	.21	.28	.75	-.86	.56	-1.54
SSTEW Overall Mean	1.21	5.43	2.84	1.03	.76	.28	2.71	-.16	.56	-.29
ECERS-3 Overall Mean	1.54	4.54	2.94	.74	.31	.28	1.11	-.59	.56	-1.05
ERS Maths Factor	.61	2.56	1.29	.53	.62	.28	.82	-.60	.56	-1.07

Table 3.9 Correlations (Pearson's r) between ERS variables for school-level quality sample (n=72)

*= p<.05, **=p<.01

	ERS Oral Language Factor	ECERS-3 Mean	SSTEW Mean	ERS Maths Factor
ERS Oral Language Factor		.81**	.95**	.62**
ECERS-3 Overall Mean			.83**	.81**
SSTEW Overall Mean				.69**

Two further methodological notes are relevant. First, the fact that the ERS were used as part of the intervention has implications for their use as a research measure (i.e. are teachers being 'trained to the test'?). Later analyses explore findings for the control group separately, as representing a sample unaffected by intervention.

Second, the ERS provide a measure of *global* quality, in contrast to the individual nature of the OLP knowledge scores. Any associations between the OLP and ERS scores will thus reflect relationships between an *individual* teacher's pedagogical knowledge and the *overall* quality of language-supporting practice in their class. Class-level quality depends on many different factors, including the knowledge, skills and practice of any other adults working with the children. All classes had at least one Teaching Assistant in addition to the teacher and, potentially, other adults present to support learning and development. This study therefore explores relationships between teachers' knowledge and their ability to lead a team in *creating* a good quality classroom environment, rather than (or as well as) relationships with their individual language-supporting practice.

3.2 Analysis strategy

3.2.1 Dimensionality assessment

Preliminary analyses considered correlations between the three Strategy, three Use of Expert Term and three Analysis scores in the full sample (n=97-104). Since the Use of Expert Term and Analysis scores tended to be skewed, Spearman's rank order correlations were used for all analyses.

Internal consistency was assessed using Cronbach's alpha (Cronbach, 1951) and Zumbo's ordinal alpha (Gaderman, Guhn & Zumbo, 2012). Zumbo's ordinal alpha can provide a more accurate estimate of reliability for items with very few response options, particularly where data are also skewed. Alphas were calculated for each 'set' of OLP scores (Strategy, Use of Expert Term, Analysis) to assess their coherence across the three video vignettes, with Zumbo's ordinal alpha employed for the Expert Term Scores due to their restricted range. Internal consistency was also calculated for all nine OLP items using Cronbach's alpha: although this test is not ideal for the restricted-range Expert Term Scores, ordinal alpha is not possible where other scores display a wide range.

Since internal consistency does not necessarily provide information on dimensionality (Yu, 2018), factor analysis was used to identify the latent knowledge constructs which best explain the observed Strategy, Use of Expert Term and Analysis Scores. For example, do the individual vignette scores cluster together to form three distinct constructs (Strategy, Expert Terms, Analysis) or are they better explained by a single unidimensional knowledge construct?

Since the OLP structure could be predicted based on prior research and theory, Confirmatory Factor Analysis (CFA) was more appropriate than exploratory techniques (Schreiber et al., 2006). The hypothesised three-, two- and one-factor models were tested using CFA (StataCorp, 2019) to establish which fitted the data best:

- **Three-factor model**
    - noticing/knowing how (*procedural knowledge*) – Strategy Scores
    - articulating how (*formal explicit procedural knowledge*) – Expert Term Scores
    - reasoning about how/why (*analytical procedural knowledge*) – Analysis Scores
- **Two-factor model A**

- noticing/knowing/articulating how (Strategy Scores + Expert Term Scores)
- reasoning about how/why (Analysis Scores);

- **Two-factor model B**
  - noticing/knowing how (Strategy Scores)
  - explicit knowledge (Expert Terms Scores + Analysis Scores)
- **One-factor model**
  - procedural pedagogical knowledge

Maximum likelihood estimation was used for the CFAs, with school-level cluster robust standard errors calculated to account for non-normally distributed data and possible intra-school correlation between OLP scores (Newson, 2018). Latent variables were allowed to be correlated. Goodness-of-fit statistics included the model Chi-square (χ^2), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker Lewis Index (TLI) and Standardised Root Mean Square Residual (SRMR) [Kline, 2005; Daire-Hooper et al., 2008 (both cited in Parry, n.d.); Schreiber et al., (2006)].

Following creation of initial models, modification indices were checked to identify potential refinements and amendments with a modification index (MI) ≥ 3.841 were considered. Only modifications which were theoretically justifiable were adopted; specifically, the addition of potential 'method' factors allowing for associations between scores derived from the same video vignette (Marsh & Bailey, 1991; cited in Jamil et al., 2015). Only method associations indicated by the modification analysis were included, rather than allowing for all potential associations.

Main analyses were conducted using the original data (n=97) but models were checked using full information maximum likelihood (FIML; Allison, 2012) to address the three missing cases for Vignette 2 and seven missing cases for Vignette 3 (n=104). All models were also checked with outliers Winsorised.

The CFA should be interpreted with some caution as the OLP Scores are not generated entirely independent of each other. The Expert Term and Analysis Scores are necessarily dependent upon the Strategy Score to some degree, since respondents can only use expert terms and provide interpretations for strategies which they have reported. Nonetheless, this analysis provides a valuable window into potential dimensionality.

3.2.2 Associations with classroom quality

The next stage of the analysis considered relationships between knowledge (as measured by the OLP) and observed quality of language-supporting practice - as measured by the four Environment Rating Scales variables (Oral Language Factor, overall SSTEW score, overall ECERS-3 score, Maths Factor). As noted, ERS variables were treated as continuous (Johnson & Creech, 1983; Norman, 2010; Sullivan & Artino, 2013; Zumbo & Zimmerman, 1993; Williams, 2018).

Associations between OLP factors and the four ERS variables were explored using Pearson's r and Spearman's rank correlations as appropriate, for the full sample and for the school-level dataset. Following this, Structural Equation Modelling (SEM) was used to establish the ability of the OLP factors to predict quality independently alongside other variables. These analyses were all conducted in the school-level dataset (original data n=71, since one respondent had not completed all OLP vignettes).

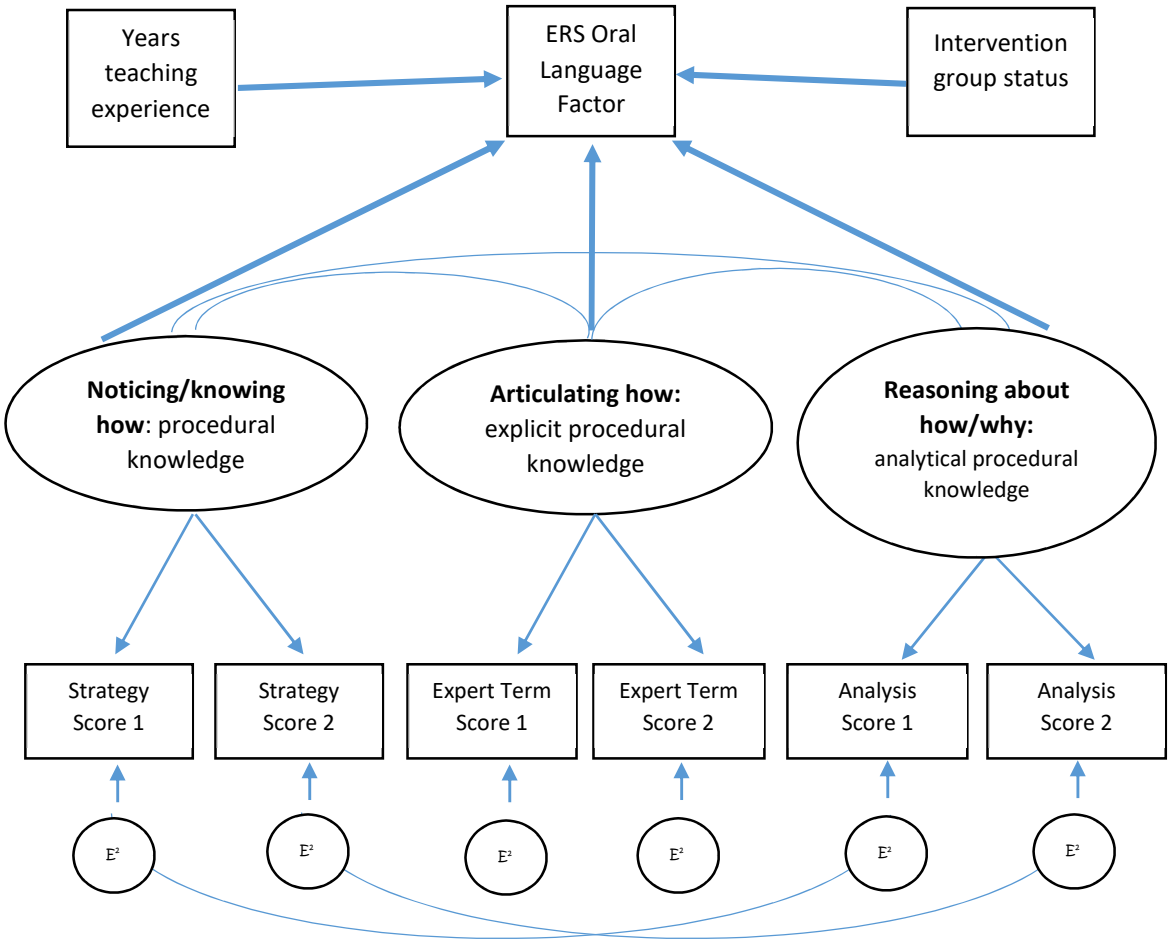
SEM can be thought of as combining confirmatory factor analysis and multiple regression (Schreiber, 2006), and comprises a measurement model (the CFA component) and a structural model (the regression component). The CFA model generated by the previous analysis was used as the measurement component of four predictive models - one for each ERS quality variable - to be tested using SEM (see Figure 3.2 for an illustration based on the ERS Oral Language Factor).[19]

The measurement component comprised three factors (*Noticing/knowing how, Articulating how, Reasoning about how/why*) based on observed data from Vignettes 1 and 2 only: Vignette 3 had been dropped following the previous CFA (see Section 3.3 for more information). The structural component of each model comprised a multiple linear regression, used to estimate the relationship between the relevant quality variable (the dependent variable) and multiple correlated independent variables (Rencher & Christensen, 2012) - in this case, the three OLP factors and two covariates (teaching experience and intervention group status).[20]

[19] Regular (rather than generalised) SEM could be used, since the censored OLP variables were predictors rather than dependent variables.

[20] All teacher and school characteristics presented in Tables 3.6 and 3.7 were tested for relationships with ERS quality, using Pearson's r correlations for teaching experience and IMD rank, and one-way analysis of variance for teaching qualification, gender, class type and intervention group status, within the school-level dataset (n=72).

Figure 3.2. Example structural equation model (SEM) for the ERS Oral Language Factor



Regression equation for structural component: ERS Oral Language Factor = a + b(noticing/knowing how) + b(articulating how) + b(reasoning about how/why) + b(years teaching experience) + b(intervention group status) + e

The main analysis was conducted on the original dataset (n=71) and checked using FIML (n=72) and Winsorised outliers, with goodness-of-fit statistics calculated for all. Post-hoc modifications were not considered necessary, since the model fit was good. Since generating statistics reflecting the proportion of variance explained is not straightforward in SEM, each of the original models were re-run using non-SEM multiple linear regression. The same models were run excluding covariates, so that the proportion of variance in quality explained by the OLP factors alone could be established.

Years of teaching experience was associated with the SSTEW scores (r=.25, p=.03). Intervention and control group schools differed significantly on their ERS Oral Language Factor scores [F(1,70)=8.31(p=.005)], their overall SSTEW scores [F{1.70)=4.80, p=.03] and their overall ECERS-3 scores [F(1,70)=4.18, p=.04], with the intervention group displaying higher scores in all cases.

Given previous indications that procedural knowledge is important for quality (e.g. Hamre et. al, 2012), and the theorised importance of all domains measured by the OLP, all three OLP factor scores were theorised to predict the quality of language-supporting practice (as measured by the ERS). Lower associations were anticipated with measures of overall quality (SSTEW and ECERS-3 overall scores) and with the quality of mathematics-supporting practice (ERS Maths factor score).

Three supplementary analyses were conducted. The first of these tested the predictive abilities of the OLP in the intervention and control groups separately. The second explored thresholds for the Use of Expert Term and Analysis scores, which both displayed a restricted range. The final sub-analysis considered the expert rating process, and whether applying the expert weightings improved the extent to which OLP scores predicted observed quality of practice.

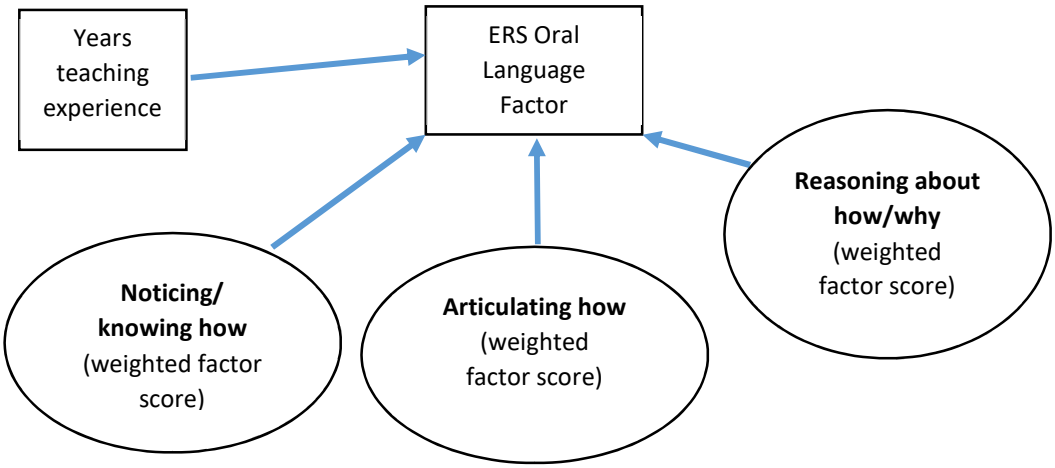
It was of particular interest to test the predictive ability of the OLP in the control group (although it meant reducing an already small sample even further) because it represented a sample unaffected by the intervention. The SEM models predicting each of the three ERS quality variable were estimated separately for the control (n=37) and intervention groups (n=34, missing=1) using robust standard errors within the school-level sample. All models failed to converge, perhaps due to the reduced sample size. In order to simplify the models, weighted factor scores were generated using coefficients from the original CFA, for each of the three latent variables (*Noticing/knowing how, Articulating how, Reasoning about how/why*). Factor scores were generated for the original sample, and also based on a CFA model estimated using FIML.[21] These factor scores were used as predictors in a series of SEMs, in place of the full measurement (CFA) component. The model predicting the ERS Oral Language Factor is shown in Figure 3.3 (below) as an illustration. As above, each model was reproduced using non-SEM multiple linear regression in order to identify the proportion of variance explained.

The findings from the separate control/intervention group models should be interpreted with some caution, since both sample sizes and subject-to-variable ratios (SVRs) were small (c.9:1). However, they provided an initial indication of the

[21] CFA in original sample: n=101 full, n=71 school-level; CFA using FIML: n=104 full, n=72 school-level

functioning of the OLP within different populations, and remained arguably within analysis parameters.[22]

Figure 3.3 Example structural model predicting observed quality in the control/intervention groups



Regression equation: ERS Oral Language Factor = a + b(noticing/knowing how) + b(articulating how) + b(reasoning about how/why) + b(years teaching experience) + e

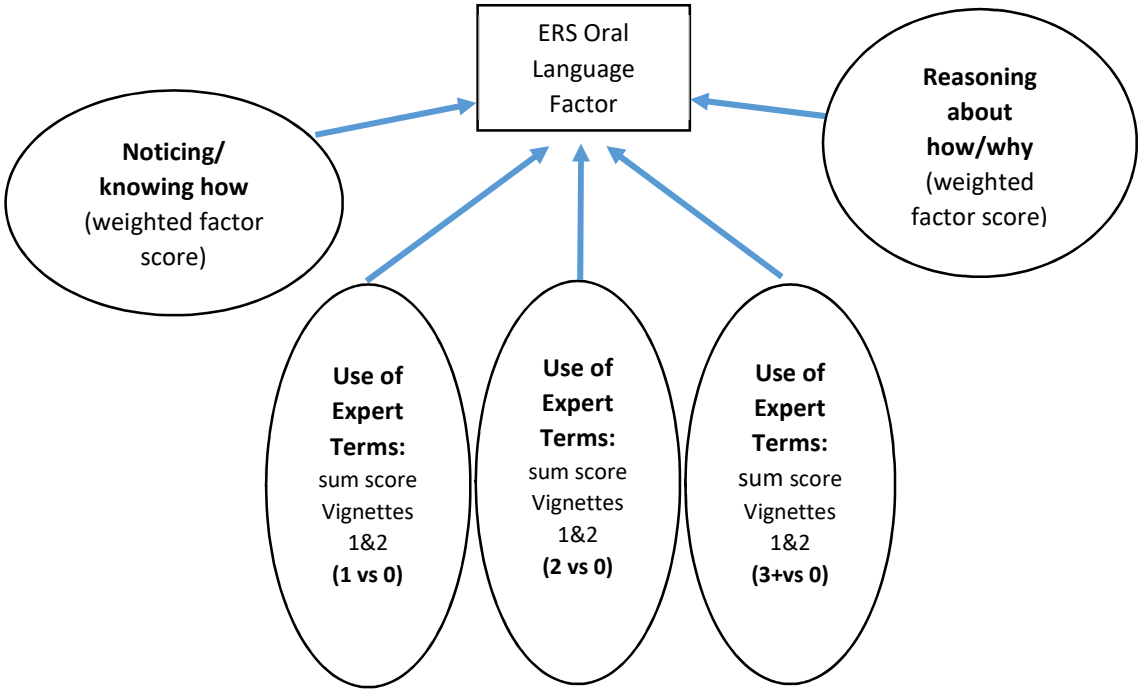
The next set of analyses explored thresholds for the OLP Use of Expert Term and Analysis scores. The aim was to explore whether these scores would be better represented as dichotomous variables (e.g. one or more expert terms vs no expert terms) or whether the number of expert terms used, or analyses reported, provides useful discriminatory information. Is what matters the ability to generate *one* expert term/interpretation, or did quality increase with the number of expert terms/interpretations provided?

In order to generate the total number of expert terms used by each respondent, a sum score was created reflecting the total number reported across Vignettes 1 and 2. This was used in place of the *Articulating How* factor score for ease of interpretation: since factor scores are continuous, they have no obvious and interpretable threshold. The sum score and factor scores were very highly correlated (r=.98), giving confidence that the use of sum scores would not introduce bias. The sum score was then converted to a series of dummy codes, reflecting the number of expert terms reported (1 term, 2 terms, 3+ terms). Three SEM models were run for the ERS Oral Language Factor,

[22] For example, Austin & Steyerberg (2015) suggest that an SVR of 2 can produce robust results, as long as the adjusted R squared estimates of variance explained are used instead of R squared estimates.

SSTEW and ECERS-3 overall scores, using the dummy Expert Term codes alongside factor scores for *Knowing/Noticing How* and *Reasoning About How/Why*, and excluding covariates (see illustration in Figure 3.4 below). The same process was followed for the Analysis Score (sum score/factor score correlation r=.10).

Figure 3.4. Example structural model testing threshold effects for the *Use of Expert Term* Scores in predicting observed quality



Regression equation: ERS Oral Language Factor = a + b(noticing/knowing how) + b(use of expert terms 1 vs 0) + b(use of expert terms 2 vs 0) + b(use of expert terms 3+ vs 0) + e

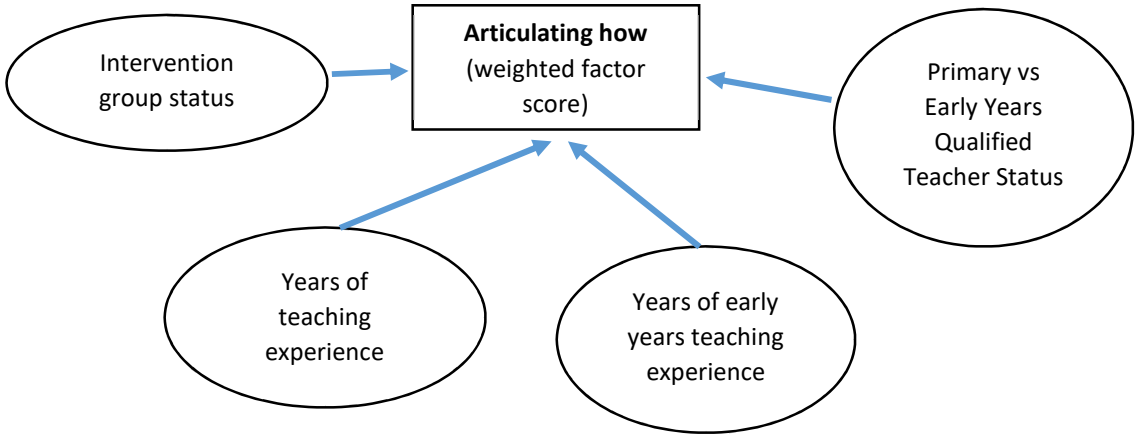
The final supplementary analysis considered the expert rating process, and the effect of applying expert weightings to the Strategy Score. To examine the effect of the '*importance for oral language'* ratings, the unweighted summed Strategy Score for Vignettes 1+2 was recalculated excluding pedagogical codes with mean expert importance rating < 3.5, and again excluding codes with a mean importance rating < 4.0. These two alternative Strategy Scores were correlated (Pearson's r correlations) with the original Strategy Score, which is based on all pedagogical codes. All three Strategy Scores were then correlated with the ERS Oral Language factor scores, to examine whether excluding the pedagogical categories rated as least important by expert reviewers led to a stronger association with observed quality.

The final step was to compare the unweighted summed Strategy Scores for Vignettes 1+2, and the equivalent Strategy Scores weighted using the ratings of '*expert presence'*. The two alternative Strategy Scores were correlated (Pearson's r) and associations with the ERS Oral Language factor scores were compared.

3.2.3 The ability of the OLP to assess change in knowledge

The next set of analyses considered whether knowledge improved through participation in the intervention and whether the OLP was able to capture such change. A series of models were estimated within the full sample for each of the OLP factors - including intervention group status, years of teaching experience and type of teaching qualification as predictors.[23] Although data were available for all respondents on their teaching qualification, including the seven respondents with a qualification listed as 'other' was not considered useful.[24] In the interests of generating interpretable findings, these were excluded to create a variable reflecting Primary vs Early Years Qualified Teacher Status (n=97). An example model is shown below (Figure 3.5).

Figure 3.5. Example structural model examining the ability of the OLP to assess change in knowledge



Regression equation: Articulating How= a + b(intervention group status) + b(years of teaching experience) + b(years of experience working with children under the age of 5) + b(Primary vs Early Years QTS) + e

[23] All the teacher and school characteristics presented in Tables 3.6 and 3.7 were tested for relationships with the OLP Factors within the full sample, using Pearson's r correlations and analysis of variance for *Noticing How* (based on the Strategy Scores), and Spearman's rank order correlations and the Kruskall-Wallis H test for *Articulating How* and *Reasoning About How/Why* (based on the Use of Expert Term and Analysis Scores). Significant effects were only identified for intervention group status: Noticing [$F(1,102)=9.11$, $p=.003$) and Expert Term Use [$\chi^2(1)=10.37$, $p=.001$]. Years of teaching experience and teaching qualification were included based on theory, and to enable to testing of convergent validity.

[24] 2 teachers finalising their status, 5 teachers who had not specified whether their QTS was primary or early years

All models were run using OLP factor scores generated using the original data (n=94) and using FIML (n=97), calculating school-level clustered robust standard errors to account for within-school clustering. Robustness checks were completed using Winsorised outliers. As before, each of the SEM models were re-run using multiple linear regression in order to identify the proportion of variance in quality explained. Finally, in order to test intervention effects for teachers who had experienced the programme as intended, all models were rerun excluding the 17 teachers who had attended fewer than five days of the six-day training course.

With the OLP factors now being used as dependent variables, it was also necessary to check that the censored nature of the Expert Term and Analysis Scores was not exerting undue influence on the results. Both these scores both displayed a large proportion of null values; that is, they were bounded or 'censored' at the lower limit of 0. We do not know whether these reflect 'true zeros' or respondents who *could* have generated an expert term or analysis, had they been given greater opportunity (e.g. had they been provided with additional vignettes, or been prompted more explicitly). Tobit regression is a form of multiple regression analysis designed specifically for censored dependent variables (UCLA Statistical Consulting Group, n.d.). A series of tobit regressions were conducted, mirroring the SEM models, for the Use of Expert Term and Analysis Scores. Since the OLP factor scores are - by nature - continuous variables centred at 0, the sum scores for Vignettes 1+2 were used in place of the factor scores. The lower censoring level was set at 0 (i.e. left-censoring).

3.2.4 Convergent validity

Options for assessing convergent validity (Schwab, 1980) were somewhat limited, given that no other tests of knowledge were administered. However, the OLP can be validated to some degree by exploring associations with teacher qualifications and experience. The models estimated in the previous section were used to examine these relationships.

Based on previous evidence that teacher competence improves only during the first years of teaching (Palmer, Stough, Burdenski & Gonzales, 2005; Rivkin, Hanushek & Kain, 2005) each model was also rerun excluding respondents with more than 7 years of experience (n=41).

3.3 RESULTS: Dimensionality testing

Tables 3.10 and 3.11 present correlations and alphas for the OLP scores, providing an initial indication of dimensionality.

The first consideration is the coherence of the individual 'sets' of scores across the three vignettes. For both the Strategy and Analysis Scores, associations were .5 or higher and Cronbach's alphas .80 or higher - indicating good internal reliability (DeVellis, 1991). Although associations may be somewhat inflated by similarity in scores within schools, this provides preliminary evidence that the Strategy and Analysis Scores derived from different video vignettes do capture coherent constructs. The internal consistency of the Expert Term scores was lower. Although the ordinal alpha was acceptable at .70 (DeVellis, 1991), there was a low correlation (.08) between the Expert Term Scores derived from Vignettes 1 and 3. This indicates that dropping one of the two vignettes may be appropriate, particularly given the desire to generate a more compact measure for future use. This possibility is explored later in the section.

Moving on now to consider associations *between* the different score types, correlations reveal small-to-moderate associations, with the strongest between the Strategy and Analysis Scores, and the weakest between the Expert Term and Analysis Scores (Table 3.10). This latter point is interesting, since the theoretical model might indicate stronger associations between Expert Term and Analysis Scores - given that both are thought to reflect explicit pedagogical knowledge. The alpha for the full OLP (i.e. all 9 scores) was moderate at .68. Taken together, these findings provide an initial indication that a unidimensional model may not provide the best fit for the OLP data.

Table 3.10 Spearman's rank order correlations between OLP Scores

n=104/101/97 for Vignettes 1/2/3 *= p<.05, **=p<.01, ***=p<.001

	Strategy Score			Use of Expert Terms Score			Analysis Score		
	V1	V1	V3	V1	V1	V3	V1	V1	V3
Strategy Score									
Vign.1				.28**	.20*	.10	.40**	.35**	.33**
Vign.2	.54**			.17	.27**	.22*	.30**	.47**	.36**
Vign.3	.58**	.73**		.05	.13	.13	.41**	.42**	.41**
Use of Expert Terms Score									
Vign.1	.28**	.17	.05				.14	.12	.14
Vign.2	.20*	.27**	.13	.42**			.07	.06	.17
Vign.3	.10	.22*	.13	.08	.40**		-.10	.02	-.18

Analysis Score									
Vign.1	.40**	.30**	.41**	.14	.07	-.10			
Vign.2	.35**	.47**	.42**	.12	.06	.02	.50**		
Vign.3	.33**	.36**	.41**	.14	.17	-.18	.52**	.52**	

Table 3.11 Alphas for the OLP Scores (n=97, missing=7)

	Cronbach's alpha	**Ordinal alpha**
3 * Strategy Scores	.80	
3 * Use of Expert Term Scores		.70
3* Analysis Scores	.83	
All 9 OLP scores	.68	

The next stage of analysis used Confirmatory Factor Analysis to consider the overall dimensionality of the OLP, by comparing the four possible theoretical models outlined in Section 3.2. Given the weak associations between Use of Expert Terms and the other OLP Scores, it might be predicted that the hypothesised one- and two-factor models would not fit the data well; and this was the case. However, the hypothesised three-factor model proved a good fit. Since the model only converged when scores from Vignette 3 were dropped, only the scores from Vignettes 1 and 2 were included. The fit for the initial model was reasonable but not perfect (Table 3.12). Modification indices (MIs) indicated a number of potential additions, of which a suggested covariance between the Vignette 1 Strategy and Analysis Scores (MI 10.11), and between the Vignette 2 Strategy and Analysis Scores (MI 9.74), were accepted for inclusion.[25] Although, in fact, neither were statistically significant, both improved the model fit.

Table 3.12 Goodness-of-fit statistics for three-factor CFA model: original and following modification

	Original model	**Final model** Original/ FIML where this differs	**Fit criteria** (see Table 3.6)
Chi squared χ^2 (degrees of freedom)*	15.69 (6), p=.02	3.04(4), p=.55/ 3.10(4), p=.54	>.05
Root Mean Square Error of Approximation (RMSEA)	.13	.00	<.08
Comparative Fit Index (CFI)	.93	1.00	≥.95
Tucker Lewis Index (TLI)	.83	1.03/1.02	≥.95
Standardised Root Mean Square Residual (SRMR)	.04	.02/-**	<.08

* Null hypothesis: the CFA model being tested does not differ significantly from the saturated model
** Cannot be calculated for FIML models

[25] Suggested covariances between the Vignette 1 Strategy Score and the Vignette 2 Analysis Scores (MI 9.50), and between the Vignette 2 Strategy Score and the Vignette 1 Analysis Score (MI 10.34), were not added due to a lack of theoretical justification for these relationships.

Figure 3.6 Procedural pedagogical knowledge - three-factor CFA model (standardised values and coefficients) n=101, clustered robust standard errors adjusted for 71 school-level clusters

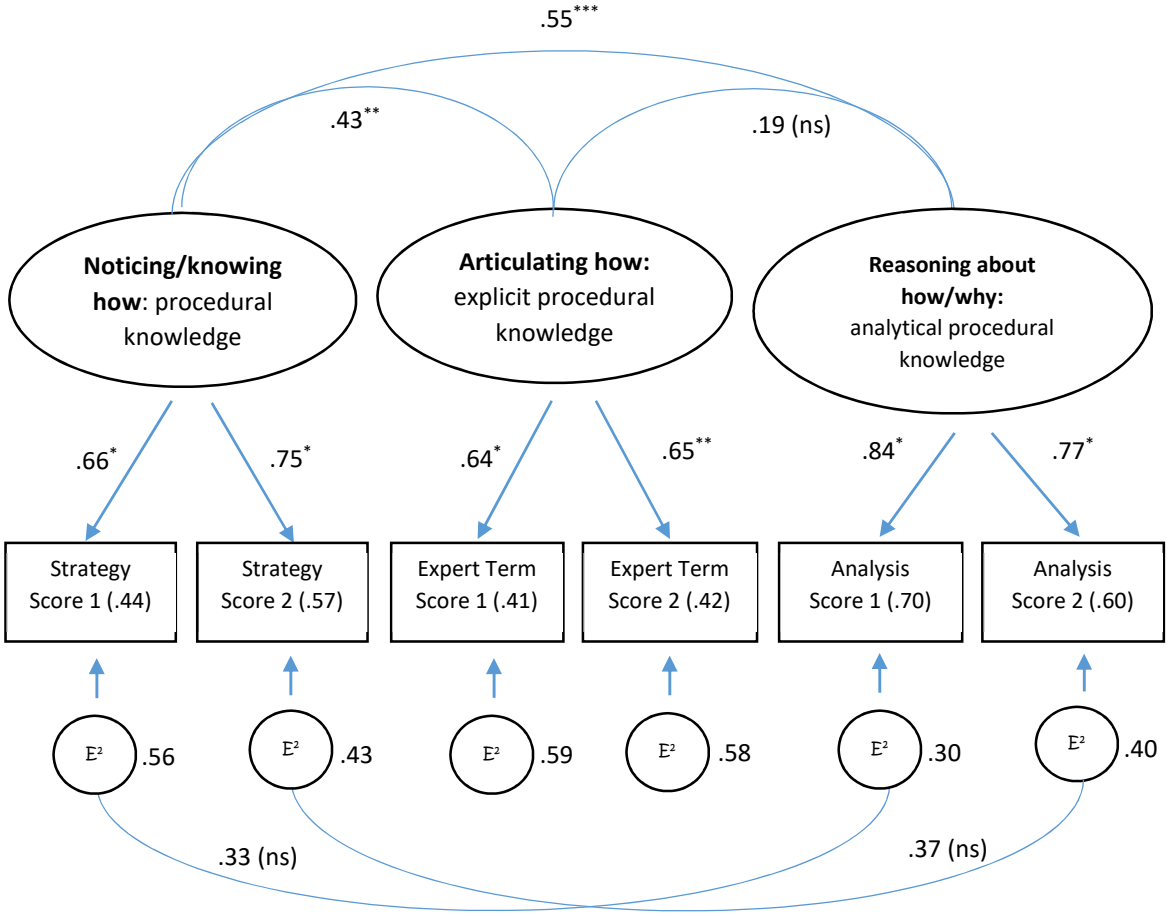


Table 3.13 Standardised (β) and unstandardised (B) coefficients for three-factor CFA

Clustered robust standard errors adjusted for 71 school-level clusters, Significance levels: *= p<.05, **=p<.01

Observed variable	**Latent knowledge construct**	**Original model** *(n=97)*		**FIML** n=104 β *(robust s.e.)*	**Outliers Winsorised** *(n=97)* β *(robust s.e.)*
		β *(robust s.e.)*	**B** *(robust s.e.)*		
Strategy 1	Noticing/knowing how	.66* (.28)	1.02 (.83)	.68* *(.28)*	.68* *(.29)*
Strategy 2	Noticing/knowing how	.75* (.31)	1	.73* *(.29)*	.74* *(.31)*
Use of Expert Terms 1	Articulating how	.64* (.31)	1	.66* *(.30)*	-
Use of Expert Terms 1	Articulating how	.65** (.24)	1.00 (.86)	.63** *(.22)*	-
Analysis 1	Reasoning about how/why	.84* (.36)	1	.85* *(.37)*	.72* (.30)
Analysis 2	Reasoning about how/why	.77* (.32)	.81 (.68)	.76* *(.31)*	.76* (.30)

The final standardised model is shown in Figure 3.6 above, with circles indicating latent variables and rectangles indicating observed variables (full results in Table 3.13). Loadings of observed variables onto the three latent variables (i.e. the standardised coefficients) were all .63 or higher and statistically significant, in both the original dataset and the FIML model. The latent factor *Noticing/Knowing How* correlated with *Articulating How* and *Reasoning About How/Why* but - as noted - there was little association between *Articulating How* and *Reasoning*.

To conclude, it appears that procedural pedagogical knowledge - as measured by the OLP - is represented best by three separate latent factors. This solution also provides some reassurance that the potential dependence of the Use of Expert Term and Analysis Scores on the Strategy Score is not exerting an undue influence on the final model - although it may to some extent be driving the correlations *between* latent factors. While the findings should be interpreted with some caution, the analysis provides a valuable insight into the possible dimensionality of procedural knowledge.

3.4 RESULTS: Associations with classroom quality

This section presents associations between the OLP factors and observed quality of language-supporting practice. All analyses were conducted within the school-level dataset (n=72), largely comprising teachers leading Reception classrooms which were observed as part of the wider RCT.

3.4.1 Correlations with quality

Table 3.14 presents associations between OLP Scores and the various Environment Rating Scale (ERS) variables. A pattern of small-to-medium-sized significant correlations was estimated across the board, indicating that all three OLP Scores have a positive relationship with observed quality of provision. Associations were strongest for *Articulating How* and for *Reasoning About How/Why*.

The strongest associations were seen between OLP Scores and the ERS Oral Language Factor, and the weakest with the ERS Maths Factor, providing some evidence of discriminant validity: language-related knowledge was more strongly related to the quality of support for children's language development than to the quality of support for mathematical development. However, the findings also indicate that the knowledge captured by the OLP is not unique to the language domain. Associations

with the ERS Oral Language Factor and the overall SSTEW score were very similar. The focus of the SSTEW is on adult-child interactions which support emotional wellbeing, language and thinking. Associations with the overall ECERS-3 score, which reflects the quality of care routines and the physical environment/resourcing as well as interaction quality, were somewhat weaker. It may be that the OLP taps into pedagogical knowledge of effective adult child interactions which are supportive of children's social, emotional and cognitive development, including - but not restricted to - support for oral language development.

The fact that correlations were weaker in the full sample (n=104) than in the school-level dataset supports use of the reduced dataset (n=72), despite the reduction in sample size. The school-level dataset was generated to maximise potential associations between OLP scores and observed quality of provision by over-selecting respondents whose classes had been observed (conversely, minimising inclusion of respondents for whom the ERS data associated with their respondent ID reflected quality in another class within their school). The remainder of analyses relating to quality of provision were, thus, conducted in the school-level dataset.

Table 3.14 Correlations between OLP and Environment Rating Scales variables

School-level dataset/full dataset, Significance levels: *= p<.05, **=p<.01, ***=p<.001

OLP Factor	ERS Oral Language Factor	SSTEW Overall Mean	ECERS-3 Overall Mean	ERS Maths Factor
	n=72 *(104)*	n=72 *(104)*	n=72 *(104)*	n=72 *(104)*
Pearson's r correlations				
Noticing/knowing how	.28* *(.28**)*	.25* *(.22*)*	.23 *(.22*)*	.24* *(.21*)*
Spearman's rank order correlations				
Articulating how	.46*** *(.36***)*	.45*** *(.34***)*	.38*** *(.32**)*	.27* *(.22*)*
Reasoning about how/why	.36** *(.33***)*	.38** *(.34***)*	.35** *(.29**)*	.25* *(.21*)*

Correlations between OLP factors and ERS quality scores for each video vignette are shown in Appendix 9. The vignettes differed in their ability to elicit knowledge which was associated with observed quality. Vignette 1 performed consistently, with small-to-medium associations identified between all scores and all ERS variables. The scores derived from Vignettes 2 and 3 varied somewhat in their associations with quality, with Vignette 3 displaying the weakest associations overall. This supports the earlier decision to exclude Vignette 3 scores from the OLP.

3.4.2 Ability of the OLP to predict observed quality of practice

The CFA presented in the previous section was used as the basis for four predictive models (one for each ERS quality variable) tested using Structural Equation Modelling (SEM). Teaching experience and intervention group status were included as covariates. Figure 3.7 shows the model for the ERS Oral Language factor; with the original CFA forming the measurement component and the structural component indicated using bold arrows. Tables 3.15 and 3.16 show results and goodness-of-fit statistics for all four models tested, including robustness checks using FIML. All models proved a good fit to the data, with only the Standardised Root Mean Square Residual outside the recommended range.

Figure 3.7 SEM for ERS Oral Language Factor (standardised values and coefficients)

n=71, robust standard errors

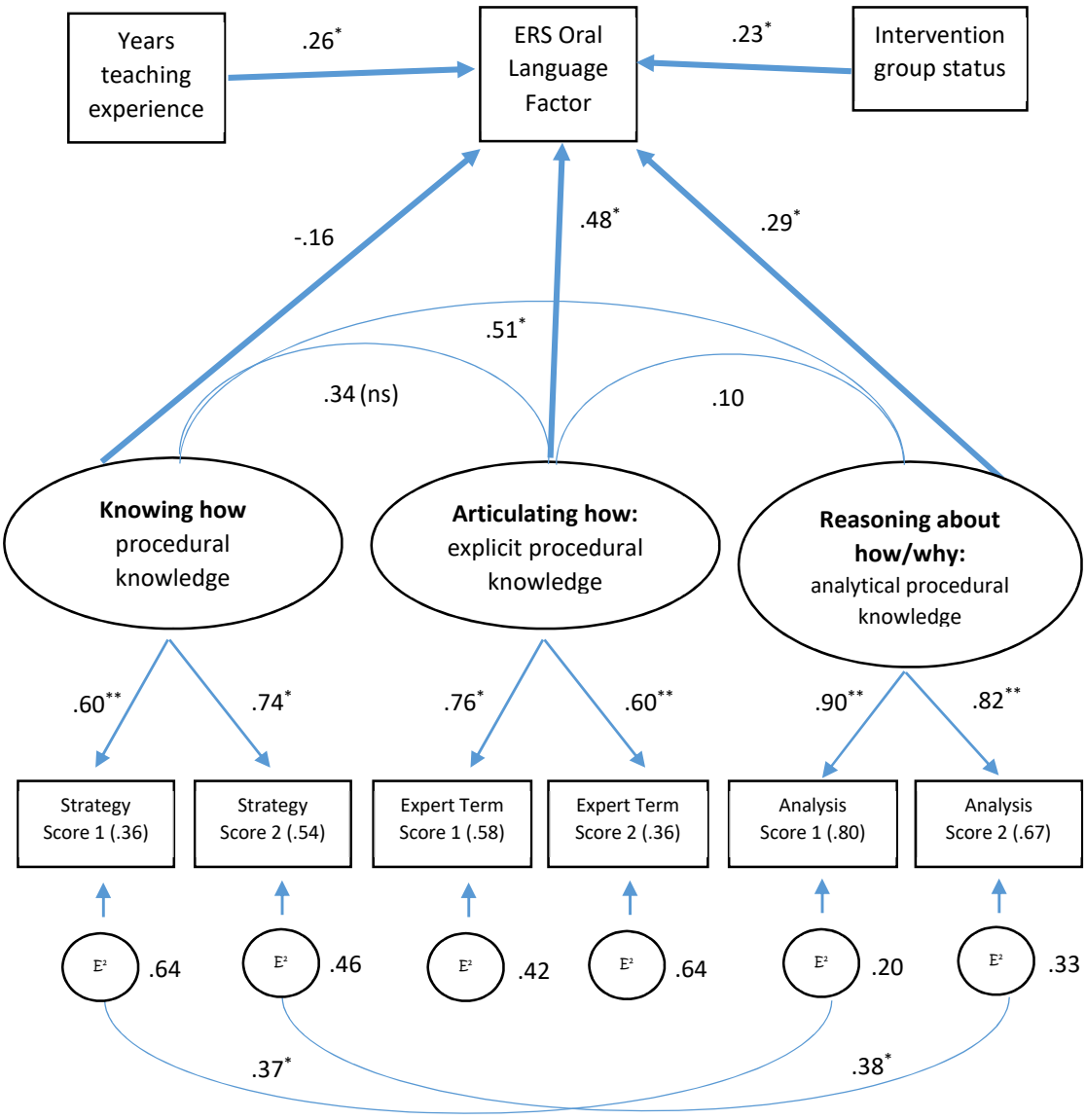


Table 3.15 Standardised (β) and unstandardized (B) coefficients for ERS quality models

School-level sample, robust standard errors.

R^2 and adjusted R2 values generated using non-SEM multiple linear regression models (see Appendix 9)

*= p<.05, **=p<.01, ***=p<.001	**Original model** *(n=71)*		**FIML** *(n=72)*	**Outliers Winsorised** *(n=71)*
	β *(robust s.e.)*	**B** *(robust s.e.)*	β *(robust s.e.)*	β *(robust s.e.)*
ERS Oral Language Factor Full model: R^2= .32***, adjusted R^2= .28 Model including only the 3 OLP factors: R^2=.23***, adjusted R^2=.20				
Knowing/noticing how	-.16 *(.22)*	-.02 *(.03)*	-.15 *(.23)*	-.13 *(.22)*
Articulating how	.48** *(.18)*	1	.48* *(.19)*	-
Reasoning about how/why	.29* *(.14)*	.27 *(.14)*	.26 *(.15)*	.29 *(.18)*
Years of teaching experience	.26* *(.10)*	.04* *(.02)*	.24* *(.10)*	-
Intervention group status	.23* *(.10)*	.47* *(.20)*	.26** *(.10)*	-
SSTEW Overall Mean Score Full model: R^2= .34***, adjusted R^2= .29 Model including only the 3 OLP factors: R^2=.26***, adjusted R^2=.23				
Knowing/noticing how	-.25 *(.20)*	-.04 *(.03)*	-.25 *(.21)*	-.24 *(.22)*
Articulating how	.53** *(.17)*	1	.54** *(.17)*	-
Reasoning about how/why	.39** *(.14)*	.36* *(.15)*	.36* *(.15)*	.42* *(.19)*
Years of teaching experience	.27** *(.10)*	.04* *(.02)*	.25** *(.10)*	-
Intervention group status	.15 *(.09)*	.29 *(.18)*	.17 *(.09)*	-
ECERS-3 Overall Mean Score Full model: R^2= .26**, Adjusted R^2= .21 Model including only the 3 OLP factors: R^2=.24***, adjusted R^2=.20				
Knowing/noticing how	-.26 *(.26)*	-.03 *(.03)*	-.25 *(.20)*	-.23 *(.31)*
Articulating how	.51** *(.18)*	1	.51** *(.15)*	-
Reasoning about how/why	.38** *(.14)*	.24* *(.11)*	.37* *(.14)*	.42* *(.19)*
Years of teaching experience	.12 *(.11)*	.01 *(.01)*	.12 *(.10)*	-
Intervention group status	.15 *(.10)*	.21 *(.14)*	.16 *(.11)*	-
ERS Maths Factor Full model: R^2= 14, adjusted R^2= .07 Model including only the 3 OLP factors: R^2=.14*, adjusted R^2=.10				
Knowing/noticing how	-.01 *(.26)*	-.00 *(.02)*	-.00 *(.27)*	-.02 *(.25)*
Articulating how	.37 *(.20)*	1	.37 *(.20)*	-
Reasoning about how/why	.24 *(.15)*	.11 *(.08)*	.23 *(.15)*	.26 *(.18)*
Years of teaching experience	.05 *(.11)*	.00 *(.01)*	.04 *(.11)*	-
Intervention group status	-.02 *(.11)*	-.03 *(.11)*	-.01 *(.11)*	-

Table 3.16 Goodness-of-fit statistics (original/FIML where this differs)

	ERS Oral Language Factor	**SSTEW Overall Mean Score**	**ECERS-3 Overall Mean Score**	**ERS Maths Factor**	**Fit criteria** (see Table 4.6)
Chi squared χ^2 (d.f.)*	19.44(19),p=.43/ 19.95(19),p=.40	19.34(19),p=.44/ 19.95(19), p=.40	21.27(19),p=.32/ 21.60(19), p=.30	19.28(19),p=.44/ 19.57(19), p=.42	>.05
Root Mean Square Error of Approximation (RMSEA)	.02/.03	.02/.03	.04	.01/.02	<.08
Comparative Fit Index (CFI)	1.0 (.99)	1.0 (.99)	.98/.98	1.0 (.10)	≥.95
Tucker Lewis Index (TLI)	1.0 (.99)	1.0 (.99)	.97/.96	1.0 (.99)	≥.95
Standardised Root Mean Square Residual (SRMR)	.09/-**	.09/-**	.09/-**	.09/-**	<.08

* Null hypothesis: the CFA model being tested does not differ significantly from the saturated model

** Cannot be calculated for FIML models

Of the three OLP factors, *Articulating How* proved the strongest predictor of observed quality of provision, followed by *Reasoning About How/Why*. Once other variables were accounted for, the ability to notice salient pedagogical features (*Noticing How*) was not associated with quality. This indicates that explicit and analytical procedural knowledge of language-supporting strategies are more important for quality than potentially informal or tacit procedural knowledge. The explicit procedural knowledge factor (*Articulating How*) displayed standardised coefficients in the region of .5 for the Oral Language Factor and the overall SSTEW and ECERS-3 scores. Thus, for every additional expert term used by respondents, ERS scores were half a point higher on the 7-point ERS scale.

Analytical knowledge (*Reasoning About How/Why*) was more strongly associated with overall quality of provision than with the quality of language-supporting practice specifically. Standardised coefficients of .39 and .38 were seen for the overall SSTEW and ECERS-3 scores respectively, with these magnitudes holding firm during robustness checks. The standardised coefficient for the ERS Oral Language factor was smaller (.29) and became statistically insignificant when robustness checks were

applied. It is worth remembering that interpretations were not explicitly prompted in the OLP survey. There may be a good proportion of respondents who were capable of providing an analysis, but who did not do so because they were not asked.

Associations with the ERS Maths factor were smaller across the board, providing evidence that the knowledge needed to support this domain is different to that needed to support children's oral language skills and more general development.

Overall, the model accounted for 32% of the variation in the ERS Oral Language factor scores, and 34 per cent of the variation in overall SSTEW scores. Variance explained was lower for the ECERS-3, and lower again for ERS Maths factor scores. All models were re-run including only the OLP factors, to establish the proportion of variance explained by the OLP alone. Between them, the three OLP factors explained 23-26% of the variation in the ERS Oral Language factor scores and the overall SSTEW/ECERS-3 scores - with the variance in quality of support for mathematics somewhat lower at 14% (see Appendix 9 for full models). Finally, a series of models were run including only the *Noticing/Knowing How* factor (based on the Strategy Scores) alongside the covariates, to establish whether this factor had a positive relationship with quality when the other two OLP factors were excluded. Associations were stronger (β=.17-.19) but not statistically significant; although the coefficient for the ERS Language Factor was close to the threshold for significance (p=.08).

It is fair to conclude, therefore, that procedural pedagogical knowledge relating to oral language (as measured by the OLP) significantly predicts observed quality of practice. While procedural knowledge of language-supporting strategies (*Noticing/Knowing How*) is associated with quality when considered alone, explicit procedural knowledge (*Articulating How*) and analytical knowledge (*Reasoning About How/Why*) overshadow the effects of strategy knowledge when entered into the same model. Teachers with greater explicit procedural knowledge had better quality classrooms, both overall and in relation to specific support for children's oral language development, with the strongest associations identified for overall quality. While knowledge of language-supporting strategies shows some evidence of subject-specificity, explicit procedural knowledge and analytical knowledge about oral language development may in fact form part of a wider pedagogical knowledge construct.

3.4.3 Examining the intervention and control groups separately

The final quality analysis considered the predictive abilities of the OLP in the intervention and control groups separately. Although this meant reducing an already small sample even further, the control group was of particular interest as it represents a sample unaffected by intervention.

Table 3.17 presents standardised coefficients and R-squared values from a series of structural and regression models conducted in the split sample - using the three OLP factors and years of teaching experience as a covariate (full models in Appendix 9). The predictors in the control group models - despite the low sample sizes - were robust, and explained approximately 40% of variation in the relevant ERS quality variable, with adjusted R-squared values all above .30. The *Articulating How* factor, *Reasoning About How/Why* factor and years of teaching experience all showed consistent positive moderate-to-large correlations with quality, while *Noticing/Knowing How* showed medium negative associations.

The OLP models were less predictive within the intervention group, with less variance explained and weaker associations between OLP and ERS variables across the board. The implications of these findings are discussed in Chapter 4.

Table 3.17 Predicting quality in the intervention/control groups: standardised coefficients and variance explained:[*] School-level sample, intervention (n=34), control (n=37), robust standard errors

Significance levels: *= p<.05, **=p<.01, ***=p<.001

	ERS Oral Language Factor		**SSTEW Overall Mean**		**ECERS-3 Overall Mean**	
	Intervention R^2=.17, Adj. R^2=.05	**Control** R^2=.42 Adj. R^2=.35	**Intervention** R^2=.24 Adj. R^2=.14	**Control** R^2=.41 Adj. R^2=.34	**Intervention** R^2=.16 Adj. R^2=.04	**Control** R^2=.39 Adj. R^2=.32
Noticing/knowing how	-.07	-.29	-.16	-.37	-.05	-.48$^{\#}$
Articulating how	.39	.50**	.46*	.46**	.38$^{\#}$	.53**
Reasoning about how/why	.18	.36$^{\#}$	.25	.49*	.20	.52*
Years teaching experience	.06	.39*	.15	.34*	-.09	.24

* Coefficients from structural models, variance explained from regression models (see Appendix 9 for full models)

3.4.4 Examining thresholds for the Analysis and Use of Expert Term Scores

This analysis considers the predictive power of the Expert Term and Analysis scores at different levels. Is what matters the ability to report *one* expert term/interpretation or did quality increase with the number of terms/interpretations provided?

The SEM models were rerun, replacing the *Articulating How* factor with dummy coded variables representing different levels of reporting (1 expert term vs none; 2 terms vs none; 3+ terms vs none) across Vignettes 1/2; with the same procedure followed for *Reasoning About How/Why.* The full results are shown in Appendix 9, and standardised coefficients for the dummy codes below.

Findings for Expert Terms indicated a monotonically increasing relationship, with a greater number of terms reflecting increasing quality. The Analysis Score showed a less predictable gradient: respondents offering two interpretations had classrooms of the highest quality: higher than respondents offering three or more interpretations, and also than respondents offering one interpretation. This is somewhat puzzling. It may be that carefully considered interpretations are more valuable than a scattergun approach, however, this does not explain the negative associations for respondents reporting one analysis.

Table 3.18 Standardised coefficients from SEM models including Expert Term/Analysis dummy codes, School-level sample (n=71), robust standard errors, 0 is the reference group

*= p<.05, **=p<.01, ***=p<.001	**Use of Expert Terms**			**Analyses Provided**		
	1 (*n=28)*	**2 (*n=16)***	**3+ (*n=11)* *Range 3-4***	**1 (*n=16)***	**2 (*n=12)***	**3+(*n=15)* *Range 3-11***
ERS Oral Language Factor	.12	.28**	.44***	-.11	.32**	.19
SSTEW Overall Score	.11	.30**	.42***	-.04	.36**	.28#
ECERS-3 Overall Score	.08	.31**	.38**	-.14	.37**	.29*

3.4.5 Considering the process of expert weighting

This final section briefly considers the application of the expert ratings to the Strategy Score, and whether they enhanced associations with observed quality of practice. In theory, the process should give greatest weight to the strategies which are most important for supporting children's language development, and which were most noteworthy within each video. Two factors are considered:

- first, whether excluding the pedagogical categories rated as least important by expert reviewers leads to a stronger association with observed quality;
- second, whether weighting the Strategy Score using ratings of 'expert presence' leads to greater associations with quality.

Table 3.19 below presents correlations between the standard unweighted Strategy Score (based on all 30 pedagogical codes) and two alternative Strategy Scores, excluding codes with mean expert importance ratings < 3.5, and excluding codes with a mean rating < 4.0. Comparisons are also made between the unweighted Strategy Score and scores weighted using ratings of 'expert presence'. Correlations were all high (>.9), providing an initial indication that the expert ratings made only a marginal difference. This was confirmed when considering correlations with quality: applying the expert ratings to the Strategy Score did little to strengthen associations with the ERS Oral Language Factor Score (Table 3.20). As a final check, the SEM model in Figure 3.7 was rerun using the unweighted Strategy Scores from Vignettes 1/2 rather than the expert-weighted scores. The results were almost identical.

Table 3.19 Pearson's r correlations between OLP Strategy Scores variations

Full sample (n=101), based on Vignettes 1 & 2 only, Significance levels: *= p<.05, **=p<.01, ***=p<.001

	Unweighted Strategy Scores		**Weighted Strategy Score (using ratings of 'expert presence')** Based on all 30 codes
	Excluding codes with Importance ratings < 3.5	Excluding codes with Importance ratings < 4.0	
Unweighted Strategy Score based on all 30 pedagogical codes	.97***	.92***	.99***

Table 3.20 Pearson's r correlations between ERS Oral Language Factor and variations on the OLP Strategy Scores School-level sample (n=71), based on Vignettes 1 & 2, Significance levels: *= p<.05, **=p<.01

	Unweighted Strategy Scores			**Weighted Strategy Score (using ratings of 'expert presence')** Based on all 30 codes
	All codes	Excluding codes with Importance ratings < 3.5	Excluding codes with Importance ratings < 4.0	
ERS Oral Language Factor Score	.21#	.24*	.20#	.22#

The fact that applying the expert ratings did not enhance associations with quality suggests that the external experts and 'teacher experts' (i.e. those with the highest-quality classrooms) did not always agree about which strategies were the most salient within each video vignette. Given that the experts and teachers were asked to respond to the OLP vignettes in slightly different ways, it is difficult to compare their ratings directly. However, insights can be gained from considering which pedagogical codes 'expert teachers' reported more frequently than teachers with poorer-quality classrooms (Table 3.21 below).

Table 3.21 The pedagogical codes assigned more often by expert teachers than by novices (i.e. for which there was a significant positive association with the ERS Oral Language factor scores or the SSTEW Overall mean) n=104, association significant at p<.05 using Pearson's r correlations denoted ✓ Corresponding ratings of 'expert presence' assigned by external expert in brackets (1=low, 5=high)

Pedagogical code/strategy	Vignette 1	Vignette 2	Vignette 3	Example responses from expert teachers
ADULTS MODELLING LANGUAGE FOR CHILDREN				
2. Modelling diverse, rich or specific grammar likely to extend the child	(3.67)	✓ (3.67)	✓ (2.67)	*"Modelling propositions"* *"Models sentence structure and links to writing"* *"Correct use of pronouns modelled"* *"Using past and present tenses"* *"Time language used to structure when it happened in the story"*
5. Emphasising, repeating or reinforcing language modelled for children	✓ (5.00)	(4.00)	(3.67)	*"Emphasis on key words - steep"* *"Created repeated exposure to new words"* *"Repeating key vocabulary clearly and explaining concepts"*
FACILITATING COMMUNICATION AND CONVERSATION				
12. Inviting communication: vocabulary	(4.67)	✓ (1.67)		*"Questions for specific nouns and uses"* *"Encouraging child to use the correct word to answer questions and explain actions"*
PROMOTING HIGHER ORDER LANGUAGE AND THINKING				
21. Use of open questions	✓ (4.67)	✓ (4.33)	(3.33)	*"Open ended questions"* *"Questioning - how did you do that?"* *"Open and closed questions"*

Four pedagogical codes were rated more frequently by teachers from higher quality classrooms, relating to the modelling of grammar (Strategy 2), emphasising and repeating language (Strategy 5), encouraging children to use vocabulary (Strategy 12) and use of open questions (Strategy 21). No differences were seen for pedagogical codes relating to word meanings, to relationships and the child, or to the provision of meaningful/engaging contexts for language-learning. The corresponding (mean) expert ratings are shown alongside, and show that external experts did not always agree with expert teachers regarding the noteworthiness of strategies within individual vignettes. There was a good degree of agreement in relation to the presence of repeated modelling of language (Strategy 5) in Vignette 1, and to the use of open questions (Strategy 21) in Vignettes 2 and 3. However, agreement was lower in relation to the modelling of grammar (Strategy 2) and encouragement for children to use new vocabulary (Strategy 12).

Table 3.22 presents ratings from the external expert perspective; specifically, the strategies considered to have the highest 'expert presence' in each vignette (>4.5). The first thing to note is that the external reviewers identified many strategies as being noteworthy. This no surprise, since vignettes were selected on the basis that they reflected positive examples of the strategies included in the OLP framework. However, it does not help to identify which strategies experts felt were *most* salient within each vignette.

Table 3.22 Pedagogical codes with expert presence ratings >4.5

Codes also associated with higher quality marked ✓

	Expert presence 1=low, 5=high		
	Vign. 1	**Vign. 2**	**Vign. 3**
ADULTS MODELLING LANGUAGE FOR CHILDREN			
3. Simple language modelling		4.67	4.67
5. Emphasising, repeating or reinforcing language modelled for children	✓ 5.00		
4. Using descriptive, informative & narrative language in concrete contexts	4.67		
FACILITATING COMMUNICATION AND CONVERSATION			
9. Engaging in conversation with children		4.67	4.67
10. Inviting communication: *non-verbal strategies*		4.67	4.67
11. Inviting communication: *verbal strategies*		4.67	5.00

12. Inviting communication: *vocabulary*	4.67	✓	
13. Being a responsive conversation partner	5.00	5.00	5.00
14. Affirming the child's language by repeating it	4.67	4.67	
15. Extending conversational or narrative content *(semantic extension)*	4.67		
16. Supporting mutual understanding and adapting language to child's level	4.67	4.67	
17. Supporting children to attend and participate		5.00	
PROMOTING HIGHER ORDER LANGUAGE AND THINKING			
18. Prediction, speculation, reasoning, explanation and inference	4.67		
19. Modelling fictional narrative			4.67
21. Use of open questions	✓ 4.67	✓	
RELATIONSHIPS AND THE CHILD			
22. Positive affect or communication	4.67	5.00	5.00
23. Individual attention and sensitive responding		5.00	4.67
24. Promoting children's self-worth			4.67
25. Using a non-directive approach		4.67	
MEANINGFUL AND ENGAGING CONTEXTS FOR LANGUAGE-LEARNING			
1. Joint attention: following children's lead and interests	4.67		
2. Providing meaningful and engaging contexts and activities for language		4.67	5.00

The second interesting observation is that the *external* experts awarded high ratings for several strategies relating to relational pedagogy (e.g. positive affect, sensitive responding, promoting children's self-worth) and to the provision of meaningful and engaging contexts for language (e.g. joint attention), while expert *teachers* were no more likely to report these strategies. The strategies more likely to be reported by expert teachers were linguistic in nature and reflected highly specific features of language support (e.g. modelling *grammar* vs modelling language; *emphasising* or *repeating* language vs simply modelling it; use of *open* questions vs unspecified questions; encouragement to use *specific vocabulary* vs general invitations to communicate). This observation may provide insights into the nature of expert professional vision; and these themes are considered further in the discussion.

3.5 RESULTS: Ability of the OLP to assess change in knowledge

The next set of analyses consider whether knowledge improved through participation in the intervention, and the ability of the OLP Scores to capture such change. The SEM models indicated that factors scores for *Noticing/Knowing How* (β=.24, p=<.05) and for *Articulating How* (β=.31, p=<.01) were significantly higher in the intervention group as compared to the control group (Table 3.23). Cohen's d effect sizes were d=.58 and .65 respectively, and identical for the more conservative Hedges' g.[26] The significant effect identified for Articulating How was confirmed by tobit regression analysis (Appendix 10). No differences were seen for *Reasoning About How/Why*.

If the intervention group respondents who had attended fewer than five days of the six-day programme were excluded from the analysis, effects were greater again (*Noticing/Knowing* How β=.30, p<.01, d=.74, g=.74; *Articulating How* β=.37, p<.001, d=.86, g=.85). Given the experimental design, with random allocation of schools, this provides evidence that procedural knowledge of language-supporting strategies improved through participation in the professional development programme. It also holds promise for the discriminatory abilities of the OLP in detecting such changes. There was no evidence that participating in the intervention improved the ability of participants to interpret or reason about teaching interactions. However, since interpretations were not prompted, this current study may not provide the best means of evaluating change in analytical knowledge.

[26] Hedges' g was also recalculated using bootstrapping for *Articulating How*: g=.68, S.E.=.20,p=.001, confidence interval -1.06 to -.29

Table 3.23 Standardised (β) and unstandardized (B) coefficients from SEM testing intervention effects

Clustered robust standard errors adjusted for 65 school-level clusters

R^2 and adjusted R2 values generated using non-SEM multiple linear regression models (see Appendix 10)

	Original model *(n=94)*		**FIML** n=97	**Outliers Winsorised** *(n=94)*
	β *(robust s.e.)*	**B** *(robust s.e.)*	**β** *(robust s.e.)*	**β** *(robust s.e.)*
Noticing/Knowing How Full model: R^2 = .09, Adj. R_2 = .05, F (4,64) = 3.05, p=.023 Model excl. intervention teachers < 5 days attendance: R^2 = .11, Adj. R_2 = .07, F (4,56) = 3.50, p=.013				
Intervention group status	.24* (.10)	2.74*(1.15)	.24* (.10)	.11 (.06)
*Intervention group status (excl. attendees <5 days) n=78, adj. for 57 school-level clusters**	.30** (.10)	3.57**(1.20)	.30** (.09)	
Primary vs Early Years Qualified Teacher Status	.13 (.10)	1.50 (1.10)	.14 (.09)	-.01 (.01)
Years of experience teaching children aged 3-5	.18 (.14)	.15 (.12)	.17 (.14)	-.03 (.03)
Years of teaching experience	-.08 (.16)	-.06 (.12)	-.07 (.16)	.01 (.01)
*Years of teaching experience ≤7 years n=40, adjusted for 33 school-level clusters***	.06 (.13)	.17 (.35)	-.02 (.16)	
Articulating How Full model: R^2 = .14, Adj. R_2 = .10, F (4,64) = 5.14, p=.001 Model excl. intervention teachers < 5 days attendance: R^2 = .21, Adj. R_2 = .16, F (4,56) = 5.44, p=.000				
Intervention group status	.31** (.08)	.21** (.06)	.31*** (.08)	.11 (.06)
*Intervention group status (excl. attendees <5 days) n=78, adj. for 57 school-level clusters**	.37*** (.10)	.26** (.08)	.38*** (.09)	
Primary vs Early Years Qualified Teacher Status	.16# (.09)	.10# (.06)	.15# (.09)	-.01 (.01)
Years of experience teaching children aged 3-5	.22* (.11)	.01* (.01)	.21# (.11)	-.03 (.03)
Years of teaching experience	-.11 (.12)	-.01 (.01)	-.11 (.13)	.01 (.01)
*Years of teaching experience ≤7 years n=40, adjusted for 33 school-level clusters***	-.19 (.15)	-.02 (.03)	-.04(.13)	
Reasoning About How/Why Full model: R^2 = .03, Adj. R_2 =.-.01, F (4,64) = 1.14, p=.346 Model excl. intervention teachers < 5 days attendance: R^2 = .07, Adj. R_2 = .02, F (4,56) = 1.44, p=.232				
Intervention group status	.05 (.10)	.09 (.18)	.04 (.10)	.11 (.06)
*Intervention group status (excl. attendees <5 days) n=78, adj. for 57 school-level clusters**	-.02 (.10)	-.03 (.15)	-.04 (.09)	
Primary vs Early Years Qualified Teacher Status	.15 (.11)	.26 (.19)	.15 (.10)	.15 (.11)
Years of experience teaching children aged 3-5	.01 (.18)	.00 (.02)	-.00 (.18)	-.03 (.03)
Years of teaching experience	-.08 (.16)	-.01 (.02)	-.07 (.16)	.01 (.01)
*Years of teaching experience ≤7 years n=40, adjusted for 33 school-level clusters***	.23* (.10)	.12# (.06)	.16 (.15)	

* Entered in place of intervention group status

** From model including intervention group status, teaching experience <7 years and type of teaching experience

3.6 RESULTS: Convergent validity

Finally, the previous analysis can provide some insights regarding convergent validity. Surprisingly, given that the OLP is designed to assess procedural pedagogical knowledge, few relationships were identified.

There were some indications that primary-trained teachers (3-11 years) might have greater explicit procedural knowledge (*Articulating How*) than teachers with a specialist early childhood teaching qualification (3-7 years). However, the effect did not reach the threshold of statistical significant (β=.16, p=.09), and was not supported by the tobit model (Appendix 10).

No associations between overall years of teaching experience and OLP scores were seen in the full sample. When the sample was restricted to teachers with seven years of experience or less, an association was seen for analytical knowledge: teachers with more experience gained higher scores (β=.23, p<.05).

Finally, an association was identified between years of experience teaching preschool children and the *Articulating How* factor: respondents with greater early years teaching experience had higher explicit pedagogical knowledge (β=.22, p<.05). The effect was not strong, and dipped below the significance threshold once robustness checks (FIML and tobit regression) were applied. It is also interesting to note that the effect of early years teaching experience was only visible once overall years of teaching experience was accounted for.

CHAPTER 4: DISCUSSION

The findings of this study indicate that the OLP has potential for capturing the dynamic procedural knowledge of in-service teachers relating to oral language development, providing insight into the craft of teaching and the ways in which teaching quality might be improved.

The OLP has demonstrated psychometric robustness, predicted observed quality of classroom practice, and showed a capacity to detect intervention effects. Explicit formal knowledge and analytical procedural knowledge *(Articulating How*, *Reasoning About How/Why*) were the strongest predictors of observed classroom practice. The intervention being evaluated improved procedural knowledge of language-supporting strategies, including informal and explicit formal knowledge, but had no discernible effect on teachers' ability to *reason* about classroom events. This concluding section discusses the findings in greater depth, considering each of the research questions in turn, and drawing implications for understanding professional vision, and the ways it can be measured and improved.

4.1 Question 1: is there sufficient variation in OLP scores to form a useful measure?

4.1.1 What can be learnt about measuring procedural knowledge?

The OLP Strategy, Use of Expert Term and Analysis Scores provided sufficient variability to support measurement. The Strategy Scores, particularly with the addition of expert weightings, generated a normal distribution. However, the Use of Expert Term and Analysis Scores, while clearly demonstrating variability adequate to predict observed quality of practice, displayed a severe floor effect. Future refinements of the OLP could increase variability and reduce the number of zero responses.

The Use of Expert Term Score could be expanded, for example, by including additional expert terms, or by identifying vignettes with the explicit aim of eliciting specialist terms. A further possibility would be to widen the terms to include those indicating content knowledge relating to oral language (e.g. specific linguistic terms such as tenses, pronouns and prepositions). However, since this would reflect content rather than pedagogical knowledge, it would need to form a separate scale dimension.

Addressing the range within the Analysis Score is more straightforward: an obvious improvement would be to prompt for interpretations explicitly. The ways in which this might be achieved are considered later in this chapter.

It is also worth considering the coverage of pedagogical strategies and contexts within the OLP. The expert review process confirmed that the vignettes represented a wide range of language-supporting strategies. However, the exclusion of Vignette 3 reduces the range somewhat, and means that certain contexts and strategies remain unrepresented, including the use of fictional narrative (Strategy 20), the reinforcement of learning across multiple contexts (Strategy 30) and whole-group teaching.

In addition, none of the vignettes were considered to reflect expert practice in relation to the explicit definition of vocabulary. While the narrowing of focus to two vignettes has advantages for completion time, reducing research burden and potentially enhancing quality of response, future versions may need to consider the extent to which the OLP adequately covers the range of strategies/contexts needed to provide an authentic assessment of oral language-related pedagogical knowledge. The assessment context matters a great deal, when aiming to capture situated professional vision.

4.2 Question 2: is the OLP internally consistent and what is its dimensionality?

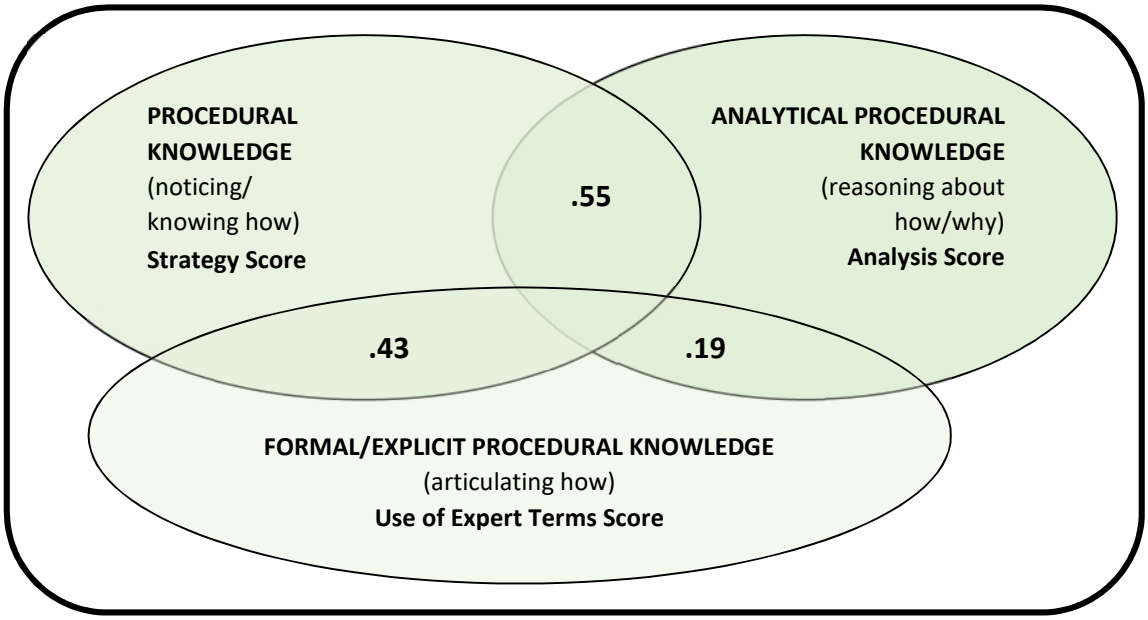
4.2.1 What can be learnt about procedural knowledge?

Findings suggest that the data were best described by a three-factor model comprising *Noticing/Knowing How* (procedural knowledge of language-supporting strategies), *Articulating How* (formal explicit procedural strategy knowledge) and *Reasoning About How/Why* (analytical procedural knowledge). Although the three factors were correlated, it appears that procedural knowledge relating to oral language takes the form of coherent and distinguishable elements rather than a single construct. The empirical distinction between noticing and reasoning confirms previous research (e.g. König et al., 2014; Seidel & Stürmer, 2014). The fact that correlations between factors were moderate confirms that valuable information is provided by each OLP dimension, independent of the others.

The strongest associations were seen between *Noticing/Knowing How* and *Articulating How* (.43), and between *Noticing/Knowing How* and *Reasoning* (.55) (Figure 4.1). The

correlation between *Articulating How* and *Reasoning* was smaller (.19) and not statistically significant. The high correlations with *Noticing/Knowing How* may, to some extent, reflect the dependence of *Articulating* and *Reasoning* on the reporting of a strategy. Nonetheless, some inferences can be drawn: for example, that informal procedural knowledge *(Noticing)* and analytical knowledge *(Reasoning)* are more strongly associated than informal and formal procedural knowledge (*Noticing and Articulating).*

Figure 4.1. The cognitive facets of pedagogical content knowledge and associations between them



The low correlation between *Articulating* and *Reasoning* is particularly interesting, since reasoning is theorised to involve the transformation of explicit knowledge (König et al., 2014; Putnam & Borko, 2000). The TEDS-M study found, for example, that theoretical knowledge is more closely related to reasoning than to noticing (König et al., 2014). In this study, it may be that reasoning and informal procedural knowledge *(Noticing/Knowing How)* are more closely related because they both depend on classroom *experience* (i.e. opportunities to observe strategies in action and notice their effects on children's development). In contrast, explicit procedural knowledge and the use of expert terminology *(Articulating How)* can be developed only through formal opportunities to learn.

Another explanation may be that the *Articulating How* factor is not picking up the full range of explicit procedural knowledge. Holistic interpretation of classroom events requires both knowledge about learners and learning (e.g. the typical stages of

language development) and knowledge of pedagogical techniques. In order to reason about the potential purpose of a teaching interaction or the likely effect on children's thinking/outcomes, teachers must have explicit knowledge of both aspects (Schulman, 1986). This can be seen by examining responses credited as providing an analysis within the OLP (e.g. *"used open questions to develop the child's narrative skills"*). It is possible, therefore, that the low correlation between *Reasoning* and *Articulating* stems from the fact that the Use of Expert Terms score elicits only a narrow portion of the full formal procedural knowledge which teachers need to interpret classroom events. It may be better described as a measure of professional *vocabulary* because it relates to the specialist description of language-supporting strategies. Future versions of the OLP might extend the scope to address aspects relating to learners and learning, in addition to pedagogical strategies.

The final point to note is that previous studies have been conducted mainly with middle and secondary educators. Whilst it is likely that procedural knowledge displays similar dimensionality across teaching phases (particularly given the apparent universal quality of the *Articulating How* and *Reasoning* factors in this study) there may also be unique characteristics of the early childhood context. For example, while content is important at all ages, early childhood educators require broader but arguably less detailed content knowledge within multiple domains - rather than deep and comprehensive knowledge within one specific subject. Similarly, while attention to social and emotional support is important at all ages, such factors have, arguably, a higher salience when working with very young children. Such factors may contribute in subtle ways to differences in pedagogical knowledge structures across teaching phases – and explain variations between the findings of the current study and previous research.

4.2.2 What can be learnt about measuring procedural knowledge?

Study findings indicate that the OLP provides a reliable measure of pedagogical knowledge and can be coded reliably. Exploring the dimensionality of the individual OLP scores reveals that these were largely coherent across video vignettes - also indicating that measuring and combining scores across multiple vignettes is a valid approach (Jamil et al., 2015). The low associations between Use of Expert Terms in

Vignettes 1/3 may derive from the specific vignette features, and the ways in which these elicit expert knowledge.

Detailed exploration of the data reveals a role for the identification of open questions. A high proportion (45%) of expert terms credited were references to open questions. Both external experts and expert teachers judged Vignette 3 to have fewer high-quality examples of open questions; and Vignette 3 Expert Term scores also showed the weakest associations with observed quality. Perhaps the lower predictive power of Vignette 3, and its lack of coherence with Vignette 1, derives from respondents who (not incorrectly but also not expertly) identified open questions as a strategy present within Vignette 3. This finding highlights both the importance of capturing *salience* when crediting responses, and how sensitive the elicitation of knowledge is to context. Given the focus of the study, it is no surprise that knowledge is highly context-specific. These reflections do, however, confirm the need for further careful attention to content validity and to the assessment context when refining the OLP.

4.3 Question 3: to what extent does the OLP predict the quality of respondent's classrooms, as measured by observational rating scales?

4.3.1 What can be learnt about procedural knowledge?

The OLP significantly predicted observed quality of practice, confirming the importance of procedural pedagogical knowledge (Schulman, 1986) relating to oral language. Specifically, the findings provide evidence that professional vision, defined as the ability to perceive what is happening within the classroom and to make professional sense of it (Stürmer et al., 2013; Sherin, 2001), supports teachers in offering higher quality practice for preschool children.

Articulating How

Teachers with higher formal explicit procedural knowledge (i.e. those who used more expert terms to describe the strategies they noticed) led classrooms with higher-quality language-supporting practice. For every additional term used by respondents, the ERS Oral Language factor was half a point (β=.48) higher on the 7-point ERS scale. Given the relatively low variability in ERS scores within the sample as a whole, half a scale-point difference is very meaningful. The relationship followed a clear gradient, with quality increasing as specialist term use increased.

This confirms both the importance of formal knowledge, and the notion that procedural knowledge developed through transforming declarative knowledge is more deeply codified than knowledge developed tacitly through experience - and is therefore more supportive of expert and intentional practice (Kelchtermans, 2004). It also highlights the importance of access to formal and specialist learning opportunities for early childhood professionals.

Associations were as high for the overall SSTEW (β=.53) and ECERS-3 (β=.51) scores as they were for the ERS Oral Language factor - indicating that the knowledge captured by *Articulating How* is not specific to oral language. Rather, it may reflect broader explicit pedagogical knowledge and, crucially, the ability to *articulate* this knowledge. Since ERS scores reflect global rather than individual quality, a higher score means that the teacher in question leads a *classroom* offering higher-quality support for language and learning - rather than (or as well as) being individually more skilled. Classroom quality encompasses the practice of other staff members, the quality of the physical environment and aspects such as planning and assessment practices. It is plausible that teachers with greater explicit knowledge are better equipped to communicate their knowledge to other staff members and, as a result, to exhibit greater pedagogical leadership. Thus, they are better able to *create* a high-quality learning environment.

It is worth reflecting on the precise nature of Expert Term Score. As noted, it does not capture explicit knowledge across all the pedagogical domains needed for teaching. Rather, it reflects the ability to describe strategies noticed within the video vignettes using specialist terminology. It might, therefore, be defined as a measure of professional *vocabulary*. Learning the language of a discipline is part of learning the discipline itself (Schleppengrell, 2007). Whilst knowing the word for a concept does not necessarily indicate full understanding of that concept, it is extraordinarily hard to engage in explicit discussion or reflection upon a concept (or to articulate its importance to others) until one can name it. The 'professional lexicon' of early childhood teachers may be a valuable focus for future research. Although such efforts have begun in relation to the lexicon of mathematics teachers (e.g. Mesiti et al., 2017), this has not yet been a focus for early childhood professionals.

Reasoning About How and Why

The second predictor of observed quality was the ability to analyse the interactions seen in OLP video vignettes. While analytical pedagogical knowledge has been identified as theoretically important (van Es & Sherin, 2002; Seidel & Sturmer, 2014; Kersting, 2008), existing studies have focused on subject teachers of older children, and validation against practice and child outcomes is in the very early stages. To the author's knowledge, this is the first study of early childhood teachers to identify a link between analytical knowledge and observed quality of practice. The OLP *Reasoning* factor was significantly associated (in the region of .4) with overall SSTEW and ECERS-3 scores. Associations for language-supporting quality were lower and on the threshold of statistical significance indicating that - as with explicit procedural knowledge - analytical knowledge is not domain-specific.

These findings offer preliminary, but important, evidence that analytical knowledge supports high-quality practice; and that expert teachers are more equipped to reason about or explain the potential purpose behind teaching interactions, to predict or reason about children's thinking/outcomes, and to generate possible alternative approaches (Berliner, 1992; Bromme, 2001; König & Lebens, 2012; Leinhardt & Greeno, 1986; Sabers, Cushing, & Berliner, 1991; Seidel & Sturmer, 2014; van Es & Sherin, 2002). It makes intuitive sense that teachers who are better able to ascribe intention to others are themselves more skilled at pedagogical reasoning within the classroom. Reasoning involves the explicit transformation of knowledge, and supports more deliberate and intentional teaching practice (König et al., 2014; Putnam & Borko, 2000). As with explicit procedural knowledge, it may also support teachers in pedagogical leadership; for example, in explaining to their wider teams the reasons why certain practices are important. This may partly underlie associations with the global ERS scores.

The fact that interpretations were not explicitly prompted means that conclusions must remain tentative. The teachers who provided an interpretation are those to whom it spontaneously occurred to do so, which may in itself be an indicator of expertise. The analytical knowledge of these teachers was 'close to the surface' and easily elicited; which may indicate a deeper, richer and more interconnected codification, supporting spontaneous retrieval. Teachers who make the assumption

that observed interactions involve a degree of intentionality are arguably more likely to *themselves* be intentional teachers. Perhaps there are others who *could* have provided an interpretation if prompted but whose interpretative abilities are less deeply codified - meaning that associations with observable practice are less strong for this group. As a result, explicitly prompting interpretations within the OLP might lead to *weaker* associations with observed quality of practice, rather than strengthening them.

This hypothesis is supported by the findings of Kersting and colleagues (2010), who used video vignettes to elicit a number of different domains of interpretation from mathematics teachers. She identified a relationship with student learning outcomes only for the *spontaneous* generation of possible suggestions for improvement. While this requires further exploration, the study findings point to an important potential role for analytical knowledge.

Noticing/Knowing How

Procedural knowledge of language-supporting strategies *(Noticing/Knowing How)* was displayed small associations (β=.17-.19) with observed quality when entered alone into the regression model alongside covariates, mirroring the association (.17) identified between the VAIL total score and quality - as measured by the CLASS rating scale (Jamil et al., 2015). However, these were not statistically significant; and disappeared altogether once explicit knowledge and analytical knowledge were accounted for.

This does not necessarily mean that strategy knowledge is unimportant, but that explicit knowledge is a stronger quality driver. The Strategy Score likely reflects both formal and informal (potentially tacit) procedural knowledge. With explicit knowledge already accounted by Use of Expert Terms, only informal strategy knowledge is 'left over' for the Strategy Score. It makes intuitive sense that such informal knowledge, while it may support an individual's own teaching practice, may not be adequate to influence global classroom quality. As noted, being able to articulate good-quality pedagogy to others, and explain why certain practices are important, is an important aspect of pedagogical leadership. Had a measure of individual teaching quality been available, a stronger relationship with the Strategy Score might have been identified.

Another possibility is that that - once explicit procedural knowledge is accounted for - a high Strategy Score represents indiscriminate noticing (i.e. the tendency to list as many strategies as possible without being able to distinguish which are most salient). The Strategy Score is intended not simply as a measure of which strategies are *known*, but as a measure of which strategies are *noticed*. To some degree, this may reflect a failure of the expert review process, which was intended to weight responses to credit the most salient strategies reported. This hypothesis is supported by the fact that applying the expert weightings did not improve associations with quality, and further by the fact that relationships between *Noticing/Knowing How* and quality became *negative* when accounting for explicit knowledge (in the control group, a high *Noticing/Knowing How* score showed a statistically significant negative associated with overall quality of provision). Implications for refining future iterations of the OLP are discussed further below.

Summary

To conclude, it seems clear that explicit knowledge about the how and the why of practice matter most for quality; more so than informal knowledge, particularly when it comes to ensuring the overall quality of early childhood classrooms. Such knowledge may mediate individual professional growth, and also support teachers in successful pedagogical leadership.

These findings extend current literature, providing the first empirical evidence that the procedural pedagogical knowledge of early childhood teachers leads to higher quality teaching. To the author's knowledge, it is the first preschool study to demonstrate a link between analytical procedural knowledge and quality. Between them, the OLP factors explained 23-26% of variation in observed quality of classroom practice, as measured by the Environment Rating Scales. With study condition and teaching experience included as covariates, the SEM model explained 26-32% of variance in quality and, when the control group (i.e. a non-intervention population) was considered separately, this rose yet further (39-42%). In comparison, the only known early childhood video measure (VAIL, Jamil et al., 2015), which focuses on 'noticing', explained 12% of the variation in observed quality, as measured by the CLASS rating scale.

Ironically, given the stated aim of the study to develop a measure focusing on oral language knowledge, it appears that the OLP is not domain-specific. While some evidence of discriminant validity was provided by weaker associations with the ERS Maths factor, the *Articulating How* and *Reasoning* factors predicted overall quality of provision as strongly as language-supporting quality. They appear to reflect wider explicit procedural and analytical knowledge. Given the inclusion of strategies focused on relationships and the child within the OLP framework, it may be that the OLP taps into both instructional and relational pedagogy.

The findings also likely reflect the interconnected nature of pedagogy in early childhood, and the fact that oral language underpins all domains of learning. It is interesting to note, however, that the VAIL appeared to show more evidence of domain-specificity and discriminant validity, perhaps because it focused on noticing, rather than on more the more cognitive and analytical facets of knowledge.

4.3.2 What can be learnt about measuring procedural knowledge?

While this initial pilot of the OLP has been successful in predicting observed quality of classroom practice, a number of reflections can be made to guide future assessment work. These include the importance of capturing teachers' ability to notice the most *salient* language-supporting strategies within interactions, and a richer understanding of their analytical abilities – so that associations with quality can be further explored. The degree to which procedural knowledge can (and should) be assessed in a domain-specific manner also warrants reflection.

A greater focus on salience

Greater emphasis on *salience* may help to ensure that the OLP Strategy Score captures the ability of teachers to attend to what is important within a teaching interaction more effectively. The first issue to consider is the way in which teachers are prompted. Other studies (e.g. Seidel & Stürmer, 2013) have used forced-choice response formats to elicit knowledge about specific aspects of interest within video vignettes, and to determine what is known about them. However, when aiming to capture what a teacher naturally attends to within a teaching interaction, this may narrow their gaze in an artificial manner (Roose, Goossens, Vanderlinde, Vantieghem & Avermat, 2018). It is not possible to know what would have been noticed, in the absence of a specific prompt. While open-

response formats are more challenging to code, they offer an arguably more authentic window into professional vision (and interrater reliability for the OLP was reassuringly high). However, the OLP prompts could usefully be refined to further emphasise salience, for example:

> *"Think carefully about the interaction, and the strategies this teacher is using which might support the oral language development of the children she is working with. List the strategies* ***which you think are most significant****. This means:*
>
> - *the strategy is important for supporting oral language;*
> - *the teacher in the video is using the strategy effectively (i.e. appropriate for the child and situation, expertly conducted, likely to have a positive effect)".*

The second area for attention is application of the 'expert weightings'. The value of expert judgement is recognised in providing benchmark to evaluate whether teachers are noticing the 'right' things (Stürmer, Königs & Siedel, 2014). Their use is predicated on the notion that experts have highly integrated and well-structured knowledge, allowing them to be more effective than novices in identifying the salient features of an interaction (Berliner, 1986, 1992; Sabers, Cushing, & Berliner, 1991). However, identifying a valid and reliable benchmark can be challenging to achieve in relation to video vignettes (Kersting, 2008), as indicated by the lack of agreement between experts in this study, and by the fact that using expert ratings to weight the Strategy Score did not noticeably improve predictive power. The external experts did not always agree with each other, or with the 'teacher experts' in the study sample (i.e. teachers whose classes offered the highest quality language-supporting practice). Whilst the rationale for the benchmarking process was reasonable, it appears that the method was not entirely successful.

This may have been due to differences in the way in which external experts and teachers were asked to complete the observation exercise. Teachers were asked to watch the vignettes and record what they noticed (up to eight strategies per vignette). However, in order that an expert weighting could be applied to all 30 pedagogical codes, experts were asked to consider *all* strategies and assess the extent to which they occurred in each vignette in an expert manner. In the same way as forced-

response questions may artificially direct the gaze of respondents, it is possible that this highly systematic approach interfered with experts' natural and holistic ability to identify the most salient interactions (i.e. it muddied the waters of their professional vision). Closer agreement may have been seen, had the same method been used for all reviewers.

Further insight can be gained by considering the expert teachers in the sample, and what they attended to. Expert and novice teachers were equally likely to report strategies relating to relational pedagogy (e.g. positive affect, sensitive responding) and to contexts for language-learning (e.g. joint attention, providing engaging resources and activities). In contrast, teachers with higher-quality classrooms were more likely than novices to notice specialist language-focused techniques, such as using open-ended questions, grammatical modelling and the repeated modelling of language. These aspects are arguably more fine-grained, perhaps perceivable only by experts who can filter out broader relational practice (taking this as given) to focus on the more specialist linguistic aspects of the teaching craft. The external experts did not filter out such aspects, perhaps because their gaze was directed towards each strategy in turn. The systematic nature of the exercise may have made it more difficult to apply their 'expert filters'.

It is clear that further attention is needed to capture the nuances of expert judgement in relation to the OLP vignette content. A first step would be to ask a broader range of experts to assess the vignettes in the same manner as teachers (i.e. identifying the most salient interactions) and to conduct a more nuanced assessment of the reasons behind their choices. These should include experts with current or recent practice experience, and potentially also those with classroom or video observation experience.

One study, for example, surveyed an impressive 38 experts, all working in the field of teacher education, as a 'pedagogic counsellor', or with a background in empirical research (Roose et al., 2018). This innovative study also addressed the problems of artificially guiding expert gaze, and demonstrated excellent levels of expert agreement. On the basis that experts naturally attend to different features of an interaction, the authors argue that knowledge assessments involving pre-defined questions, or open responses scored using rubrics, inherently interfere with holistic expert observation. Aiming to capture the professional vision of secondary inclusive classroom educators,

they instead asked experts to make a series of comparative judgements about pairs of video vignettes, based on the theory that humans are more capable of comparing items against one another, than they are at comparing items against specified criteria (Thurstone, 1994).

Their argument was supported by qualitative investigation of experts' reasoning about their choices. This revealed that, although experts were highly consistent in their comparative rankings, they relied on different theoretical frameworks and arguments in making their decisions. Such comparative assessments also show good potential for eliciting tacit knowledge, since teachers completing the assessment following the expert review process were not required to articulate their reasoning (Lesterhuis et al., 2017). Whether or not the inclusion of comparative judgements is considered as a means of refining the OLP, it seems clear that a phase of deeper qualitative work exploring expert judgements of the video vignettes would be valuable. This should include asking experts to explain their reasoning, either in written form or using think-aloud techniques (Young, 2005).

A greater focus on eliciting analytical knowledge

A second implication of the study findings is that further exploration of the role played by analytical knowledge is warranted. The next iteration of the OLP should prompt interpretations explicitly, drawing on previous literature to provide guidance. Theory and research identify a number of specific facets, which were combined within the Analysis Score in the current study, and which could valuably be separated to provide additional nuance. These include teachers' ability to provide an explanation or interpretation of potential pedagogical intention, to predict or reason about children's thinking/outcomes, and to make decisions based on their reasoning - including generating possible alternative approaches (Blömeke et al., 2015; Kaiser et al., 2015; Kersting et al., 2010; Stürmer et al., 2013; Voss et al., 2011). Given that the relatively blunt Analysis Score used in this pilot proved a strong predictor of observed quality, it is likely that a more nuanced approach will provide further insights. Since additional complexity will bring further challenges in terms of coding, any further development of analytical items should be included within the detailed expert benchmarking process.

Domain specificity

Finally, it is worth reflecting on the extent to which a domain-specific approach can be supported, given the apparently broad predictive abilities of the OLP. Although what teachers know about how to support a specific domain of learning matters, it seems that broader cognitive and analytical expertise cuts across domains. A valuable next step for research would be to focus on tools which can capture a range of cognitive skills (e.g. noticing, interpreting), across different subject domains, to explore commonalities in procedural pedagogical knowledge.

4.4 Question 4: does the OLP show evidence of convergent validity?

4.4.1 What can be learnt about improving procedural knowledge?

Although associations were not large (or indeed, statistically significant), there were some indications that primary-trained teachers (3-11 years) might have greater explicit procedural knowledge than teachers with a specialist early childhood teaching qualification (3-7 years). This prompts reflection on the nature and content of teacher training in England. Does the primary qualification provide more effective preparation, or is the difference due to the characteristics of teachers who tend to undertake these pathways?

The general lack of findings for teacher education is, in many ways unsurprising; all respondents were trained teachers and had thus undertaken study to Bachelor degree level. Greater differences might have been identified in a sample with broader variations in the years and level of educational qualifications (e.g. Jamil et al., 2015).

The lack of association between teaching experience and procedural knowledge is more puzzling, particularly given that years of teaching experience did predict observed quality of practice. The null findings for *Noticing/Knowing How* are particularly puzzling, given the strong theoretical rationale that such knowledge develops through classroom experience and by watching others (Eraut, 2004; van Es & Sherin, 2002, 2006). Previous studies have also found it hard to detect relationships between professional vision and experience (Jamil et al., 2015; Kersting, 2008).

Given evidence that broader teacher competence improves only during the first few years of teaching (Palmer, Stough, Burdenski & Gonzales, 2005; Rivkin et al., 2005), it is

possible that the same applies for noticing. However, no supporting evidence for this hypothesis was found in the current study, although it was only possible to restrict the sample to teachers with seven years of experience or less. Even in a study of preservice secondary education teachers (i.e. those yet to begin their teaching careers), Stürmer et al (2014) failed to identify effects of practice internships on professional vision, in relation to general pedagogical knowledge.

It appears that not all experience is 'good' experience when it comes to developing procedural knowledge. Stürmer et al. (2014) hypothesise that their null effects might stem from variation in the schools where the students gained their experiences, and in the professional discourses happening there (or not), which might facilitate or hinder the integration of new knowledge. Mere 'classroom time' is not enough to ensure that noticing takes place.

There were some indications in the current study that growth in analytical knowledge takes place during the first few years of in-service teaching, but that growth slows as teacher become more experienced. This fits with the notion that integrated knowledge structures can be developed only through practical experience (Berliner et al., 1988; Darling-Hammond & Bransford, 2005; Grossman, 1990; Putnam & Borko, 2000), which provides teachers with opportunities to understand the how and the why of practice in context.

Taken together, these findings reflect the complexities of developing teacher competence, and highlight the importance of ensuring that teachers during the early years of their teaching careers are supported actively to develop their professional vision through their informal opportunities for learning.

4.4.2 What can be learnt about measuring procedural knowledge?

The options for future assessment of convergent validity are somewhat limited by the lack of available procedural knowledge measures. However, it would be valuable to compare the more generic VAIL measure – addressing a wide range of early childhood interactions (Jamil et al., 2015) - with the OLP for the same sample of early childhood teachers. Examining associations with a measure of language content knowledge would provide further insights.

Efforts should also be made to explore the effects of different formal and informal learning opportunities on the development of procedural pedagogical knowledge, within teacher qualification, through in-service professional development and through experience.

4.5 Question 5: to what extent can the OLP assess change in knowledge through intervention

4.5.1 What can be learnt about improving procedural knowledge?

Teachers who participated in the intervention showed greater procedural knowledge of language-supporting strategies than teachers in the control group (*Noticing/Knowing How* and *Articulating How)*. Given that the intervention taught teachers to be more observant of practice (within videos and in the classroom), it might be expected that the intervention group would improve at noticing (e.g. Hamre et al., 2012). However, the fact that it did so is interesting, given the lack of relationship between years of teaching experience and *Noticing How/Why*. This shows that, with explicit efforts to guide teachers' gaze, such abilities can be improved - even in teachers with wide-ranging levels of experience.

Explicit procedural knowledge (or potentially professional vocabulary) also improved, with an effect size of .58 for the whole sample, and .86 for teachers who had attended five days or more of the training programme. This is consistent with previous research: a study evaluating the impact of a professional development intervention using the early childhood VAIL video measure (assessing teachers' ability to notice effective interactions) identified an effect size of .60 (Hamre et al., 2012). This suggests that procedural knowledge can be improved through in-service professional development.

Given the importance of *Articulating How* for observed quality of practice - and since both knowledge and practice improved – it can be postulated that changes in knowledge mediated changes in quality. Although this may be true to some extent, it is likely that the process of professional growth is more complex (Dann, 2000; Goldsmith & Schifter, 1997). This is evidenced by the fact that associations between observed quality and pedagogical knowledge (*Articulating How* and *Reasoning About How/Why*) were notably weaker in the intervention group than in the control group; as, in fact, were associations between observed quality and years of experience. This suggests that some

teachers had improved their knowledge but not their classroom practice or - vice versa - that some had improved practice but not made detectable gains in procedural understanding.[27]

It may be that, when teachers have been trained in a specific technique (e.g. noticing) that their use of this techniques is less linked to their 'quality'. Another hypothesis is that new knowledge gained by the intervention group was still in the process of being embedded and integrated to form lasting professional competence. Participating teachers may have developed new pedagogical understandings, but not yet fully translated these into practice. For example, they may have become aware of new strategies through watching training videos, learned new specialist terms for these strategies, and begun to reflect on when and why they might employ them; but not yet had the time and rehearsal opportunity to cement this into practice. At this early stage of new learning they could 'talk the talk' but not yet 'walk the walk'. Another plausible theory is that some participating teachers had improved their own knowledge and - potentially - their own practice, but had not yet had time to involve other staff members within their classes to the degree that their classroom-level ERS scores improved.

Alternatively, it may simply be that the process of professional growth is not as straightforwardly linear as indicated in the study's simplistic theory of change, whereby improvements in knowledge take place first, followed by improvements in practice (e.g. Hamre et al., 2012). Clarke and Hollingsworth's (2002) model of interconnected growth emphasises the multi-layered nature of developing professional competence, which takes place through cycles of enactment and reflection (Figure 4.2). In this model, changes through professional development may first occur in practice through professional experimentation (e.g. trying out an idea observed in a video or shared by a fellow-attendee). Observing and reflecting on the effect of these changes for children may then lead to changes in knowledge and knowledge structures.

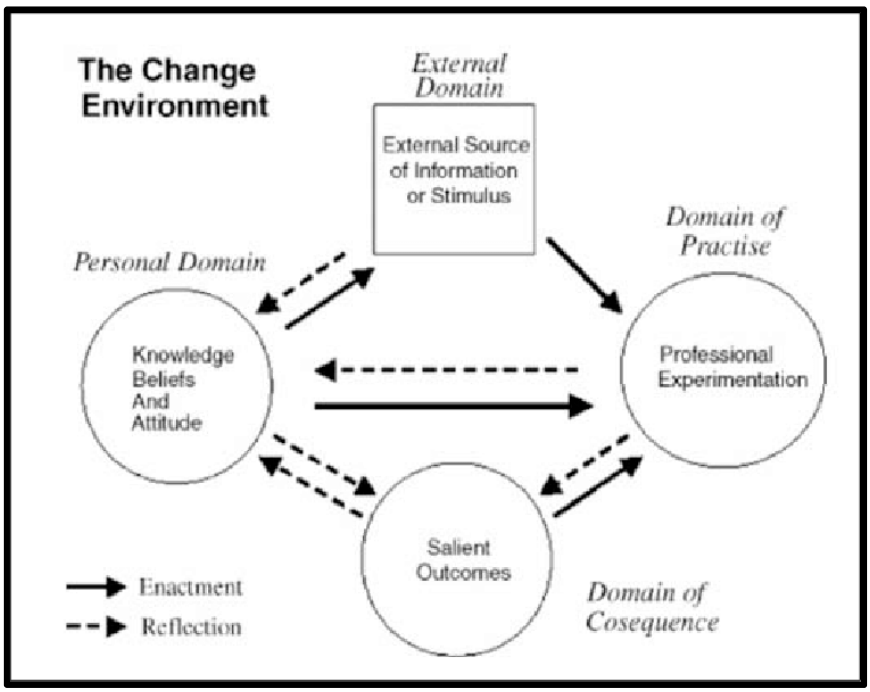
Whatever the answer, findings for the intervention group paint a picture of professional knowledge 'in flux', whereas relationships between knowledge and practice appeared to be more stable for the control group. This is good news for the predictive abilities of

[27] Weaker intervention effects in the intervention group could also plausibly stem from a reduction in variance, as either knowledge or quality improved. This was not true for the OLP scores (Table 4.1), but was true for the ERS scores [Intervention group Oral Language Factor Score mean =3.13, s.d.=.86; Control group equivalent mean=2.65, s.d.=1.19).

the OLP, since findings for the control group reflect likely performance in the wider population of teachers. Taken together, the OLP factor scores and years of teaching experience explained 39-42% of variance in the observed quality of support for oral language, and in wider quality of provision for the control group. The intervention group findings have valuable implications for professional development, in recognising that professional growth takes time and is complex, and may involve a potential period of flux while new understandings become embedded and transformed.

Finally, it is worth noting that no intervention effects were identified for analytical knowledge. This was not an explicit focus of the programme, so it is perhaps not surprising that analytical abilities did not change. However, given the associations between *Reasoning How/Why* and observed quality, it does raise the question of how growth in professional interpretation can best be supported. In addition to knowing how to 'do', expert teachers need the ability to reason about classroom events and interactions (van Es & Sherin, 2002; Seidel & Stürmer, 2014). Given the indication above that analytical knowledge may develop during the first seven years of teaching experience, efforts should focus particularly on support for early-career professionals.

Figure 4.2. Clarke and Hollingsworth's (2002) model of professional growth



4.5.2 What can be learnt about measuring procedural knowledge?

The findings indicate that the OLP is able to detect change in knowledge through intervention. Future directions, particularly given the lack of a pre-test in the current study, might involve the exploration of professional growth over time, and within different populations. If, as findings indicate, the OLP is able to capture oral language-related procedural knowledge, there are many open research questions which it can help to address, whilst further testing its discriminatory properties.

As noted, future studies could consider knowledge-growth through initial teacher training, professional development, and classroom-based experience; and could assess knowledge in populations with more widely varying qualifications, such as staff working in the non-government maintained sector. Exploring how knowledge develops through varying formal and informal learning experiences will help to inform the refinement of teacher preparation efforts, identifying more precisely what fosters knowledge and competence, under which conditions, and for which educators.

4.6 Study limitations

Thorough discussion of research limitations and their implications has been woven throughout the preceding chapters, including reassurance that interpretation of study findings is not under threat.

Other issues worth noting include the relatively small sample size and the lack of child outcomes. Whilst moderate in size, the sample of 104 teachers and 72 schools restricted the extent to which nuanced analysis could be conducted, particularly sub-group or mediation analyses. The fact that responses were gained only from 62% of schools may also influenced the findings. Respondents were representative of the wider RCT sample in relation to their observed quality of practice but there is no way of knowing the degree that they reflected the wider population with regard to other characteristics.

Finally, the lack of opportunity to validate the OLP against child outcomes means that the ultimate question - the extent to which knowledge matters for children's language development - could not be addressed within the current scope. At a later date, it will be possible to extend the analysis to include child assessment data gathered as part of the wider RCT.

4.7 Final reflections and comments

The OLP has demonstrated psychometric robustness, predicted observed quality of classroom practice, and shown a capacity to detect intervention effects. Teachers with greater explicit procedural knowledge, and those who provided interpretations of the interactions they identified in video vignettes, led classrooms with higher overall quality of practice - and also demonstrated higher-quality language-supporting practice. Although there is value in informal knowledge of '*how to do'*, explicit knowledge of *how* and *why* matter more. These findings extend current literature, providing among the first empirical evidence that the procedural pedagogical knowledge of early childhood teachers leads to higher quality teaching.

The study findings also demonstrate the complexity of professional growth, and the need for careful consideration of formal and informal learning opportunities, to ensure that teachers develop the explicit and analytical knowledge they need to support children's development. While the low association between procedural knowledge and years 'in the classroom' shows that not all experience is good experience, this study shows that carefully-designed professional development, with a combination of theoretical input and in-class support for implementation, can support the development of professional vision.

The findings provide rich material to inform understanding of pedagogical knowledge as a multidimensional construct, to guide future research and to inform the development of teacher preparation efforts within the domain of oral language and beyond. The fact that both teachers and experts reported enjoying the process of completing the OLP suggests that it has promise as an ecologically-valid and authentic tool, reflecting the complexities and the richness of early childhood pedagogy and children's learning.

Finally, on a personal note as the author, the study will have significant implications for my own work as a practitioner and researcher and, indeed, has already done so. As one of the developers of the early childhood intervention being evaluated, my own gaze was unavoidably influenced by insider involvement; and stepping back to achieve an objective view has been sometimes challenging, but always worthwhile. After years of assessing quality using the systematic Environment Rating Scales, my starting point for capturing knowledge was - I now realise - biased heavily towards defining the

behavioural strategies practitioners should ‘know’: a checklist for knowledge. A growing understanding of the multidimensionality of professional knowledge, and the importance of higher-order and deeply cognitive skills such as analysis and interpretation, has broadened my professional vision.

These findings are already informing my work as a designer and evaluator of oral-language-focused professional development programmes. They have also renewed my respect for the work of early childhood teachers, and the depth and complexity of their profoundly important professional vision.

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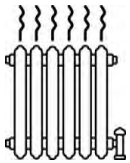
APPENDICES

APPENDIX 1: Language Learning Principles underpinning the intervention

	How children learn language	How to support that learning
1. Be a magnet for communication 	Children learn language best when they use it. To feel motivated to communicate with you, children need to feel valued, competent and confident: appreciated for who they are and what they can do; and that you want to hear what they have to say. Children talk most to people that they think like them! Children communicate in many different ways, including through non-verbal means (body language, gestures and behaviours). An EAL child in their silent phase will still be communicating with you, even though they are not yet using English. Young children are still developing their processing abilities and need time and space to respond to communication.	Help children to feel noticed and valued. Show that you know them as individuals and give each child individual attention, including reluctant communicators who may not ask for it directly. Use praise and encouragement often, and be specific. *'I love the way you kept trying even when things got difficult'* builds persistence and self-esteem more effectively than '*good girl*'. Use descriptive commenting to narrate a child's actions. This shows you have noticed what they are doing, as well as modelling language and thinking. Be an active listener and a responsive language partner. Encourage children to initiate conversation by showing that you are relaxed and 'open for business'. When children do communicate, show interest by using body language, using their name and getting down to their level. Observe, wait and listen before speaking, to allow the child space and time to think and respond (1 ½ -2 times your usual waiting time). Let children know that you have understood them by confirming, repeating and extending their communication. Encourage them to talk more by responding with interest, asking genuine, open questions and praising both verbal and non-verbal communication.

2. Create irresistible and meaningful contexts for communication 	Children are most confident and motivated to talk about things they have experience of, and are interested in. They learn and use language best in contexts that are meaningful to them, and when they are actively involved. Some children will need more help than others in making meaning from language, and will need concrete experiences to be successful. Play, exploration and investigation offer highly meaningful contexts for language learning because they harness children's interests and allow them to practice language, social and self-regulation skills with peers. Children at play often use more complex language and grammar than in other contexts.	Build on children's interests and existing knowledge to harness their enthusiasm to communicate and to learn. Provide rich and varied resources and experiences to promote communication, and make sure that they are meaningful and irresistible to *your* children. New themes can provide exciting contexts for language, but make sure that children have the experience and words they need to access play and exploration confidently in new contexts. Group resources together by theme so that they are meaningful: this enables children to learn the words related to these resources more quickly. Use concrete props, pictures and real experiences during activities and when reading books, to support children with poor language or learning English to get actively involved, understand what is being said and communicate with others. Make sure that there is time and space for communication within your classroom. Provide meaningful learning experiences over time by developing and deepening themes rather than jumping from one topic to another; and by providing follow-up activities so children can practice new language and ideas across multiple concrete contexts (e.g. props/puppets after reading a book so children can act out the story).
3. Support language at home 	Parents and the home environment are the most significant influence on children's language development. To provide the most effective support for children language skills, early years practitioners should encourage and support parents to play with, talk to and read with their children.	Let parents know how important their role is, and how they can help children to develop their language. Support them in playing and talking with children at home, for example by sending books and resources home and giving ideas for how they might use them with their children. Include parents in any themes or activities you have going on in the classroom and give ideas about how they might talk to their children about these. Create opportunities to model effective interactions for parents, for example by inviting them in for workshops or to spend time in the classroom. Ask parents to help you understand their child's interest and experience. What will they be keen to talk about? Share your assessments and understandings about children's language development with parents, and ask parents to help *you* in gaining an accurate picture of their child's language abilities and progress.

4. Be a language radiator 	Children acquire new language by hearing it, and *modelling* language is an important way in which adults help children to learn. • *Quantity matters*: for example, children who hear more speech develop vocabulary more quickly. • *Quality matters*: to develop their skills, children need to experience language that they cannot yet produce. Hearing rich language - including many different words, unusual words and complex grammatical structures - is associated with faster language learning and with later literacy skills. Books provide one of the best sources of rich vocabulary and complex sentence structures: the language in books is generally much richer than in everyday conversation. When adults talk about books with children, *their* language is also more complex than in conversation. Sharing books with children has a significant, substantial and positive impact on their oral language skills.	Where are children getting new words and language from in your classroom? Model rich language and thinking. Talk often in different contexts, using a varied and rich vocabulary which is just above children's current level. Use unusual words (e.g. creep, crunch) as well as everyday words. Pay attention to using the correct words and grammar to provide a good language model. Use opportunities provided by resources and activities to introduce new words, and make sure you plan for doing this. As well as talking with the most verbal children, make sure you are modelling language for reluctant communicators, children with language delay and children in the early stages of learning English. Adapt your speech to reflect children's own language level (e.g. using shorter utterances when speaking to a silent child). During play, activities and routines, use techniques such as commenting and running commentaries to model the language for what children and adults are doing, experiencing and thinking. Adults can also help children to 'hear' and process new vocabulary and sentence structures by using contrasts in their language (e.g. that is smaller but this is the smallest). Extending children's own communication, aiming just above their current level, models the next step. Read books with children daily, including reading aloud to children and reading *with* children (e.g. interactive shared book reading and dialogic reading). This allows children to access the language and ideas in books which they cannot yet read by themselves.

5. Create a culture of adult-child conversation 	Engaging in conversations with adults is one of the most powerful ways in which children learn to use language. Children need many opportunities for dialogue with multiple turns, supported by a more experienced conversation partner. This will support all aspects of language development but is particularly important for developing narrative skills (being able to describe things, tell events in order and retell stories). Children need narrative skills to communicate socially with others and to discuss and organise their lives into meaningful episodes. To learn to discuss abstract ideas, children also need practice at talking about things that are not right in front of them (e.g. events in the past, or which will happen in future). Books provide a powerful context for conversation. Techniques such as interactive shared book reading and dialogic reading have a particularly strong evidence-base.	Make your classroom a place for conversation. Discuss a wide range of subjects with children, including non-present as well as present topics, and stick around in conversations to deepen topics over multiple turns. Use a range of techniques for keeping discussions and conversations going, including commenting, explaining, questioning, speculating, adding information and ideas to what children say, and encouraging children to use new words themselves. Support *all* children to engage in conversation, remembering that some will need more help than others. Not all children have rich experience of conversations at home. You can provide effective practice for EAL children and children with poor language skills by using non-verbal techniques, as well as concrete props and pictures, remembering that conversations can be verbal as well as non-verbal. Also think about whether your group organisation supports all children to be actively involved: this is much harder to achieve in a large group. Read and discuss books with children often. Re-reading books allows for more in-depth discussion in later readings, as children become familiar with the words and ideas. You can also use more challenging techniques (e.g. open-ended questions, speculation) in later readings, to extend language and thinking.

6. Support children to communicate with and listen to each other 	Children learn a great deal through interacting and communicating with peers. They can learn language and positive behaviours from each other. Shared play also provides a rich context for children to practice language, social and self-regulation skills with their peers in a meaningful context. There is good evidence that small-group discussions and activities supported by an adult can promote language development. Adults can actively scaffold peer communication and encourage children to talk with and listen to each other. They also play a key role in supporting social skills and self-regulation, so that children can successfully engage in peer interactions and learn from them.	Create a rich environment which promotes peer communication, including exciting things to talk about, duplicates of resources (e.g. books) and resources which promote peer interaction (e.g. small world, blocks, role play). Give children the time/opportunity to choose their own companions and engage in sustained peer interaction. Actively scaffold children's peer interactions and communication, using techniques such as descriptive commenting to help children notice each other, and to draw them into peer conversation. Praise positive examples of peer communication, interaction and listening, including non-verbal communication. Use social coaching techniques to support social interactions. Encourage participation and turn-taking in group activities, ensuring that all children get a chance to speak. Use props and non-verbal communication to support children who are reluctant, unable to talk or are learning English. Small group activities are more supportive of peer interaction and communication than large groups. With older children, explicit talk-partner techniques such as 'Think, Pair, Share' can support peer communication during group times.
7. Create repeated opportunities for children to bump into and use new words 	Children learn the words that they hear and use the most. Repeated exposure helps children to understand and remember the meanings of new words. Some research suggests that at least 20 exposures to a new word are needed for a child to 'own' it and start using it as part of their own spoken vocabulary. Children need frequent opportunities to experience and use new words in a *range* of meaningful contexts so that they can process them deeply and actively.	If children have come across new words, for example through a new topic, group activity or reading a new book, make sure that these words are reinforced by providing opportunities for children to 'bump into' and use them in many different contexts. For example, provide resources in play areas which relate to the new words, or props and puppets so that children can act out a new story themselves. Adults can also reinforce new words by modelling them in a range of contexts. Plan follow-up and extension activities, and link learning across a range of meaningful and connected experiences. Repeated reading of books can also help to reinforce any new words introduced within them.

8. Offer children clear information about word meanings 	Although young children do learn words simply from hearing them, offering clear and child-friendly explanations of new words during conversation, book-reading and activities increases vocabulary learning significantly. Adults play an important role in defining and explaining new words to help children learn them. Remember that words are much more than just a label: each word represents a concept. To truly understand the word '*dissolve*' for example, a child needs to have concrete experience of what this means. To understand the word '*conductor*', a child needs to have a concrete idea of what a conductor might look like, wear and do.	When using a new word, provide an explicit and accessible definition for children so that they understand the meaning of the word. During reading, explain new words as you are reading (although it is also important not to interrupt the flow of reading too often, particularly on a first reading). Intentional teachers will also prepare for new vocabulary, for example by indentifying new words before reading a book with children for the first time. Introducing children to vocabulary beforehand (e.g. using props and puppets) can help children to access a new book or topic because the new words no longer represent a barrier to understanding. As well as verbal definitions, using gestures, props, pictures, symbols and signing can help children to understand the meaning of new words. This is particularly important for children with limited vocabularies or other language delays. Techniques such as labelling (naming familiar and unfamiliar objects, actions and abstract concepts) can also help children to learn word meanings.
9. Provide sensitive and meaningful feedback on children's language 	Children need timely and positive feedback on their use of language to help them improve their skills. When a child does not use the correct words or grammar, research shows that repeating back a correct and extended version supports language development. It allows children to directly compare their own language with a similar, but correct and more complex, version. Since it is already an idea and sentence they are familiar with, most of child's 'processing power' is available for noticing the differences.	For example, if a child said *"I wented outside"* an adult might feedback and extend by saying "*That's right, you went outside to find your friend*". Techniques such as confirming and imitating what a child says provide feedback by letting them know that they have been heard and understood. Explicit and specific praise is also a powerful feedback tool. In order to effectively feedback on and extend children's language to model the next step, intentional teachers also need a good understanding of where children should be (i.e. the typical stages of language development), and good observation skills and assessment data to identify each child's *current* stage of language development.

In developing these principles, we have drawn on a wide range of research sources, but particular thanks and credit are due to David Dickinson, Julie Dockrell, Justin Harris, Roberta Michnik Golinkoff and Kathy Hirsch-Pasek.

APPENDIX 2: Vignette transcripts

VIGNETTE 1: BLOCK PLAY

That was slower this time.

Shall I do it faster?

Yeah. Show me how you did it so you can do it faster. Was that faster or….?

A bit slower

Ok. Well try and show me how you can make it go faster. Oh yes! What did you do there? How did you do that?

I put this up (rest indistinct)

Oh I see, so you pulled it so it went up a little bit, that way? (gestures). Show me again. Show me what you did. Oh I see, so you pulled it up to make it a steeper slope.

It went fast!

It did go fast!

It went all the way there

It did. So it made it a steeper slope (gestures). Because you had it like that, didn't you and you lifted it up (gestures) and….

It zoomed down!

It zoomed down. It did zoom down, yes.

Whee!

Whee!

I can do it faster, look!

Go on then. Yes that's faster. What about how…this time, if you do it again, how far can it come down the slope? Alright, try that one, yeah.

I'll try it.

I can't make it go any different.

Ok, is there anything we could use?

I'll use this board. A bit heavier.

Ok. Alright. Is it heavier? Ok. Try that board.

It's a bit more heavier

Is it? Ok. Is it heavier than this cuboid? This long cuboid. Go on then. Try it out. Test it out.

Child rolls truck

Yes! That's right. Brilliant! Could you make that car go even….when it's gone down the slope, could it go even further?

Further

Yes, longer. Do you think it could reach me? How could you do that? Could it come towards me?

No, not over there!

Well try it, you never know. Well that was a bit further.

Yeah, further

Was that further? Yes?

VIGNETTE 2: NIAZ MAKES A LIST

What have you got, Niaz?

Breakfast!

I want a pencil

Now, are there any pencils *inside* the box?

I got it!

What do you need to do, Niaz?

Where's the pencils? I got it! I got pens in there. I got pens in there

You've got some pencils in there? Fantastic! What do you need the pencils for, Niaz?

I want to make….

I want to make a…? Are we going to write something down?

Yes please

What are we going to write?

A shopping list

A shopping list! Are you going to write it?

(Niaz gives out paper) Do we need lots of lists? Oh look, Niaz is giving you a piece of paper, Stephen, to write a shopping list. Thank you, Niaz.

A breakfast

A shopping list for breakfast. So do we have to write what we'd like for breakfast?

At breakfast time

Ok. Well for my breakfast I'd like some cereal. So I'm going to draw the box. And then I'm going to draw the bowl I'm going to eat my cereal out of. And what do you pour onto your cereal?

Milk!

Milk! So do you think I'll need some milk, too?

And you need milk to drink

Milk to drink. So I'd better get a bottle of milk as well. And then would you like an applejack? Shall I put that on my list?

No, I would like an orange

Well you put that on your list.

A pig

And you would like a pig?

I'm going to make a pig

And you would like a pig?

Draw a pig

Is this a pig?

Yes this is a pig

So would you like to eat a pig for breakfast? What are these?

This is a (unclear)

Are these his legs?

Yes, legs

VIGNETTE 3: NIAZ, THE PRICESS AND THE DRAGON

Is he going to eat her? You don't think he's going to eat her? So does he get in to the castle? Does Dragie get in? How does he get in?

Niaz: He's big, no pop in (gestures)

He's big and does he just push the door?

Yeah

Has he got big strong hands? Paws?

Niaz: And push (gestures)

And push, like that! (gestures) Does the door break?

Yeah

Oh! And he goes into the castle. And where's the princess?

She might have fallen asleep (gestures)

She's upstairs? She's asleep?

Child nods

Goes upstairs and hides in her bed

And he hides in her…oh, she's in her bed? So what does Dragie do?

Goes away

Eats her

He goes away. He eats her! Huh!

He flies away outside

Oh, he flies away outside. Does he fly away *after* he's eaten her?

Child nods

Huh! So is the princess dead?

Yeah

Oh no! Oh dear, that's very sad, isn't it? Was she crying? Did she not want Dragie to eat her? No. What will Dragie do next?

Fly away

He'll fly away….

I jumping in the wind…I jumping and blow away

You'd blow away in the wind? I hope not, then we'd have no Niaz. Where would you blow to?

In the wind!

Where would it take you?

In the castle

To the castle? Not the castle where the dragon lives?

Yes (indistinct)

Yes? Do you know that dragon?

Yes

Do you know that dragon? Do you know him? Is he scary?

Dragon….a princess dragon

The princess AND the dragon

The princess died

We told the story, didn't we, that's right, clever boy

I got it!

Oh Niaz, are you climbing up the castle wall? What's at the top?

I gonna do it

Excellent. Now you can move your other foot. Good boy.

I'm going to see the princess

You're going to go and see the princess? Look, Niaz is going to rescue her, he's climbing up the castle wall!

Look she's crying! She's crying!

Why's she crying?

Scared! Dragon! Scared!

Is she scared?

Yeah

Is the dragon going to chase her?

Yeah

What should she do?

Ee dide

She's going to die? Could she hide?

Yeah

Where would she hide?

In the bed

Go and find a hiding place for her. Where could she hide?

APPENDIX 3: Survey text

A3.1 Introductory email

Dear URLEY teacher

Welcome to the URLEY **'Observing Support for Oral Language Development' survey**. You are being sent this because your school is taking part in an important national research study which will help inform policy, practice and research about the best ways to improve children's outcomes in the early years. We are very grateful for your time as we know that teachers never have enough of it!

You can access the survey online here:
https://www.surveymonkey.co.uk/r/URLEY_Observation

In it, you will be asked to reflect on the strategies used by different practitioners to support children's oral language development. There are three clips for you to watch, each 2-3 minutes long. You will be asked to identify the strategies you think each practitioner is using to support children's language skills. This survey replaces the questionnaire abut language strategies which was used at the start of the URLEY study. We hope that it will be much more interesting to complete, and that the clips will help you to reflect on how we can best support children's language in the early years. **Each clip should take no more than 10 minutes to analyse.** We are hoping to have all responses in **by the end of this term.**

The survey will be analysed as part of a doctoral thesis rather than as part of the main URLEY evaluation but will contribute in the same way towards understanding of how to design effective professional development to help practitioners to improve children's language skills. At the end of the survey you will be given more information about this and asked to give your consent (this is voluntary and you can withdraw your consent and your answers at any time, should you change your mind).

Please do contact me if you have any questions.

Very many thanks again for your time

A3.2 Survey text

OBSERVING SUPPORT FOR ORAL LANGUAGE DEVELOPMENT

Welcome to the URLEY 'Observing Support for Oral Language Development' survey.

In this exercise you will be asked to reflect on the strategies used by different practitioners to support children's oral language development.

There are three clips for you to watch, each 2-3 minutes long. You will be asked to identify the strategies you think each practitioner is using to support children's language skills. The focus is on skills related to **making meaning through language** (e.g. communication, narrative, vocabulary, grammar) rather than on skills relating to **sounds** in words (e.g. phonological awareness). **The survey is designed to be completed by individual teachers, rather than as a team.**

You can watch clips more than once if you need to and/or print off the transcript to support your analysis. As a guide, each clip should take no more than 10 minutes to analyse: answer carefully but try not to overthink your responses. **If you do not have time to finish the survey, you can come back and finish it later as long as you access it from the same computer. Just click on the link to the survey again and it will load your original entry with the answers you have already completed.**

This survey replaces the questionnaire abut language strategies which was used at the start of the URLEY study. We hope that it will be much more interesting to complete, and that the clips will help you to reflect on how we can best support children's language in the early years.

SOME QUICK QUESTIONS ABOUT YOU

1. What is your name?

Please give your first name and surname. Your responses will be anonymous, this just helps us if we need to contact you about this exercise.

2. What is the name of your school?

3. Do you teach in nursery or reception?

Nursery ☐ Reception ☐ ☐Other (please specify) ☐

4. What is your teaching qualification?

Qualified Teacher Status Early Years (3-7) ☐ Qualified Teacher Status Primary (3-11) ☐ Other (please specify) ☐

5. How many years of teaching experience do you have? (including your NQT year)

6. How many years of early years teaching experience do you have?

7. Excluding URLEY, how many hours or days of training or other professional development have you attended which <u>related specifically to language development....</u>

…In the last 10 years

…In the last 2 years

8. If you hold any other qualifications/experience relevant to supporting early language development, please provide details

CLIP 1 BLOCK PLAY

This clip shows a practitioner in a Nursery School supporting child-initiated block play.

Source: Bradford Nursery Schools (Bradford/A+ Education DVD)

Watch the clip and identify the strategies this practitioner is using which might support children's language development. This could include children's understanding of language and/or their expression.

If you can, try to record strategies which support a range of language skills (e.g. communication, narrative, vocabulary and/or grammatical skills).

You can watch the clip again if you need to, or refer to the transcript (see p.1 of the survey to download this). Use the eight boxes below to record your answers. List as many strategies as you can, but if you identify fewer than eight you can leave some boxes blank.

Please note that the clips are hosted on Youtube. You may see some adverts displayed while you are watching. Unfortunately we are not able to block these or control their content: we hope they are not too distracting.

The text above was repeated for Vignettes 2 and 3.

THANK YOU VERY MUCH FOR YOUR TIME!

The survey will be analysed as part of a doctoral thesis rather than as part of the main URLEY evaluation, as we do not have funding in URLEY to do this. Sandra Mathers (part of the URLEY study team) is completing her doctorate at the Institute of Education, University College London and is being supervised by Professor Iram Siraj.

She is trying to find out whether the URLEY programme has changed teachers' knowledge of early language strategies; and how knowledge of early language strategies is related to practice and to children's outcomes. To do this, Sandra will link the information from this survey to data collected as part of the wider study (e.g. the children's assessments or information from the reception class observations). This will make an important contribution towards our understanding of how to design effective professional development to help practitioners improve children's language skills.

The information will be used to help both researchers and schools better understand how change happens through professional development. As well as using the information for her doctorate Sandra would use it to publish academic papers and will publish a briefing paper for schools, which all URLEY schools would receive.

Any information you provide will be anonymous. Reporting will be done at group level only - no individual staff member or school will be identified. Giving your consent is voluntary and you can withdraw your consent and your answers at any time, should you change your mind. If you would like more information or to ask any questions, please contact Sandra Mathers (sandra.mathers@education.ox.ac.uk 07976 227139) or Iram Siraj (020 7612 6218).

Please confirm that you are happy for your survey responses to be analysed and reported by Sandra Mathers as described above.

I am aware of the purpose and nature of this research and give my consent to participate	Yes ☐ No ☐
I understand that this research will follow the British Educational Research Association Code of Ethics and Conduct, including secure data storage and anonymity guaranteed	Yes ☐ No ☐
I understand that my participation is voluntary and my data will be treated in confidence	Yes ☐ No ☐
I understand that I may withdraw from this research at any time and request that any information already given be withheld	Yes ☐ No ☐
Any questions I have about the research (if relevant) have been answered to my satisfaction	Yes ☐ No ☐

APPENDIX 4: Ethics application

Institute of Education

UCL

Ethics Application Form: Student Research

Anyone conducting research under the auspices of the Institute (staff, students or visitors) where the research involves human participants or the use of data collected from human participants, is required to gain ethical approval before starting. This includes preliminary and pilot studies. Please answer all relevant questions in terms that can be understood by a lay person and note that your form may be returned if incomplete.

For further support and guidance please see accompanying guidelines and the Ethics Review Procedures for Student Research http://www.ucl.ac.uk/srs/research-ethics-committee/ioe or contact your supervisor or IOE.researchethics@ucl.ac.uk.

Before completing this form you will need to discuss your proposal fully with your supervisor(s). Please attach all supporting documents and letters.

For all Psychology students, this form should be completed with reference to the British Psychological Society (BPS) Code of Human Research Ethics and Code of Ethics and Conduct.

Section 1 Project details					
a.	Project title			Understanding and evaluating the impact of professional development for early years teachers and their teams	
b.	Student name			Sandra Mathers	
c.	Supervisor/Personal Tutor			Iram Siraj	
d.	Department				
e.	Course category (Tick one)	PhD/MPhil	☐	EdD	X
		MRes	☐	DEdPsy	☐
		MTeach	☐	MA/MSc	☐
		ITE	☐		
		Diploma (state which)	☐		
		Other (state which)	☐		
f.	Course/module title			Thesis	
g.	**If applicable,** state who the funder is and if funding has been confirmed.				
h.	Intended research start date			December 2016	
i.	Intended research end date			June 2018	

j.	Country fieldwork will be conducted in *If research to be conducted abroad please ensure travel insurance is obtained through UCL http://www.ucl.ac.uk/finance/insurance/travel*	England

k.	Has this project been considered by another (external) Research Ethics Committee?	
	Yes	External Committee Name: University of Oxford Department of Education Departmental Research Ethics Committee (DREC)
	No ☐ ⇨ *go to Section 2*	Date of Approval: 21st April 2016

If yes:

- Submit a copy of the approval letter with this application.
- Proceed to Section 10 Attachments.

Note: Ensure that you check the guidelines carefully as research with some participants will require ethical approval from a different ethics committee such as the National Research Ethics Service (NRES) or Social Care Research Ethics Committee (SCREC). In addition, if your research is based in another institution then you may be required to apply to their research ethics committee.

Section 2 Project summary

Research methods (tick all that apply)

Please attach questionnaires, visual methods and schedules for interviews (even in draft form).

X Interviews	☐ Controlled trial/other intervention study
☐ Focus groups	☐ Use of personal records
x Questionnaires	☐ Systematic review ⇨ *If only method used go to Section 5.*
☐ Action research	X Secondary data analysis ⇨ *If secondary analysis used go to Section 6.*
☐ Observation	☐ Advisory/consultation/collaborative groups
x Literature review	☐ Other, give details:

Please provide an overview of your research. This should include some or all of the following: purpose of the research, aims, main research questions, research design, participants, sampling, your method of data collection (e.g., observations, interviews, questionnaires, etc.) and kind of questions that will be asked, reporting and dissemination (typically 300-500 words).

The proposed research builds on previous efforts to develop, pilot and refine a framework for the evaluation of professional development (PD). The framework will be tested within the context of an early years PD programme for nursery and reception class teachers in maintained primary schools.

The proposed research forms a sub-study of a larger externally-funded evaluation of the PD, beginning in the autumn term of 2016. A total of 120 primary schools are participating in a randomised controlled trial, 60 of which will be allocated to the intervention group receiving the PD. Up to three nursery and reception class teachers from each of the 60 intervention schools will participate in a 10-month PD programme involving 6 days of training and individual in-class support from a mentor (approximately 150 teachers in all). It is anticipated that teachers will engage other staff in the programme on returning to their classrooms in order to enact changes in practice at the classroom level. The key aims of the PD are to improve children's language and social-behavioural outcomes, which will be assessed pre- and post-PD, along with observational measures of change in the quality of practice (ECERS-3, ECERS-E and SSTEW).

The primary research questions are:

1. What can we learn from researching the current programme about the potential impacts of PD for individual teachers and teaching assistants in the domains of affect, knowledge/skills and practice?
2. What can we learn from researching the current PD programme about effective formats and characteristics of PD for early years teachers and their teams?
3. What can we learn from researching the current programme about potential supports and barriers to implementing PD for early years teachers and their teams (including both the organisational context and the wider context)?

The study will also assess the value of the evaluation framework as a theoretical and analytical guide and whether it require adaptation, and consider what we can learn for the future evaluation of PD.

A questionnaire will be administered to teachers at up to three time-points (before the PD begins, during the PD and after the end of the programme). This will use a mix of structured and unstructured items to gather data on, for example:

- teacher characteristics (e.g. experience, age, previous PD attended)
- teacher aims and goals for the PD
- teacher affect (e.g. confidence, motivation), knowledge and skills in relation to their teaching practice and their leadership abilities;
- the extent to which the different features of the PD support teachers' professional growth;
- the ways in which participating teachers cascaded the PD to other colleagues;
- supports and barriers to enacting change.

AMENDMENT 2017: one of the measures has been adapted, and will now involve showing short DVD clips to participants (via an online survey) and asking them to identify effective teaching strategies being used by the practitioner. Prior to use, this adaptation will also be piloted with a number of individuals identified through existing relationships with the researcher (e.g. masters students, early years teachers). All pilot respondents will be fully informed and aware that their data will be used anonymously, and only for the purposes of piloting the measure.

A shorter version of the questionnaire will also be administered to one Teaching Assistant in each participating class at one or more of the time-points.

Questionnaire data will be triangulated with the quantitative data from the pre- and post-PD observations of practice in the participating classes. This will enable classes to be divided according to their change in practice over the duration of the study, and comparisons made between teachers and teaching assistants in the most and least improved classes.

Activity	Timeline
Baseline observations of practice (external evaluation)	Oct/Nov 16
Development of baseline questionnaire	Dec 16
Administration of baseline questionnaire/s	Late Jan/early Feb 17
PD intervention runs During-PD questionnaire/s administered	Late Jan/early Feb – Oct 17
Post-PD observations of practice (external evaluation)	Oct/Nov 17
Administration of final questionnaire/s	Oct/Nov 17
Analysis and writing up	Dec 17 – Mar 18
Submission	June 2018

It is also possible that I will carry out a small number of follow-up interviews (e.g. 10). Teachers would be selected for interview according to their questionnaire responses. Interviews would last no longer than one hour and be conducted in person, to better understand the questionnaire responses provided.

Section 3 Participants

Please answer the following questions giving full details where necessary. Text boxes will expand for your responses.

a. Will your research involve human participants? Yes x No ☐ ⇨ *go to Section 4*

b. Who are the participants (i.e. what sorts of people will be involved)? Tick all that apply.

☐ Early years/pre-school	☐ Unknown – specify below
☐ Ages 5-11	x Adults *(teachers)*
☐ Ages 12-16	☐ Other – specify below
☐ Young people aged 17-18	

NB: Ensure that you check the **guidelines** (Section 1) carefully as research with some participants will require ethical approval from a different ethics committee such as the National Research Ethics Service (NRES).

c. If participants are under the responsibility of others (such as parents, teachers or medical staff) how do you intend to obtain permission to approach the participants to take part in the study?

(Please attach approach letters or details of permission procedures – see Section 9 Attachments.)

Not applicable

d. How will participants be recruited (identified and approached)?

Participants will all be teachers and teaching assistants taking part in the wider project, for which ethical approval has already been granted.

If I receive ethics clearance in time, I propose to recruit teachers at the launch event in December. If not, I will recruit them by email and then explain the research in person on the first day of the PD.

I will explain my aims, proposed methods and how the findings will be used and disseminated. I will also explain that participation is voluntary and that, should they consent to take part, they will be able to withdraw at any time. I will also explain that this research is separate to the wider study (although embedded within it) and that non-participation in my research will not disadvantage them in any way with regard to the wider study.

I will provide all teachers participating in the PD project with a pack containing an information leaflet, a consent form and a return envelope. Consent will be requested for three elements:

1. To use any secondary study data which relates to them as individuals (e.g. attendance at training, data from the pre- and post-PD observations)
2. To use their questionnaire responses

	3. To take part in an interview. The information leaflet and consent form for teachers have been submitted with this form. I will also create a similar set of material (leaflet and consent form) for teaching assistants taking part.
e.	Describe the process you will use to inform participants about what you are doing. See d) above
f.	How will you obtain the consent of participants? Will this be written? How will it be made clear to participants that they may withdraw consent to participate at any time? *See the guidelines for information on opt-in and opt-out procedures. Please note that the method of consent should be appropriate to the research and fully explained.* See d) above
g.	**Studies involving questionnaires:** Will participants be given the option of omitting questions they do not wish to answer? Yes x No ☐
	If **NO** please explain why below and ensure that you cover any ethical issues arising from this in section 8.
h.	**Studies involving observation:** Confirm whether participants will be asked for their informed consent to be observed. Yes ☐ No ☐
	If **NO** read the guidelines (Ethical Issues section) and explain why below and ensure that you cover any ethical issues arising from this in section 8.
i.	Might participants experience anxiety, discomfort or embarrassment as a result of your study? Yes ☐ No x
	If **yes** what steps will you take to explain and minimise this? If **not**, explain how you can be sure that no discomfort or embarrassment will arise?
j.	Will your project involve deliberately misleading participants (deception) in any way? Yes ☐ No x
	If **YES** please provide further details below and ensure that you cover any ethical issues arising from this in section 8.
k.	Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)? Yes x (for interviews) No ☐
	If **NO** please explain why below and ensure that you cover any ethical issues arising from this in section 8.
l.	Will participants be given information about the findings of your study? (This could be a brief summary of

	your findings in general; it is not the same as an individual debriefing.) Yes x No ☐
	If **no**, why not?

Section 4 Security-sensitive material
Only complete if applicable

Security sensitive research includes: commissioned by the military; commissioned under an EU security call; involves the acquisition of security clearances; concerns terrorist or extreme groups.

a.	Will your project consider or encounter security-sensitive material?	Yes ☐ *	No ☐
b.	Will you be visiting websites associated with extreme or terrorist organisations?	Yes ☐ *	No ☐
c.	Will you be storing or transmitting any materials that could be interpreted as promoting or endorsing terrorist acts?	Yes ☐ *	No ☐

* *Give further details in* ***Section 8 Ethical Issues***

Section 5 Systematic review of research
Only complete if applicable

a.	Will you be collecting any new data from participants?	Yes ☐ *	No ☐
b.	Will you be analysing any secondary data?	Yes ☐ *	No ☐

* *Give further details in* ***Section 8 Ethical Issues***

If your methods do not involve engagement with participants (e.g. systematic review, literature review) ***and*** *if you have answered* ***No*** *to both questions, please go to* ***Section 10 Attachments.***

Section 6 Secondary data analysis Complete for all secondary analysis

a.	Name of dataset/s		
b.	Owner of dataset/s		
c.	Are the data in the public domain?	Yes ☐	No x
		If no, *do you have the owner's permission/license?* Yes x No* ☐	
d.	Are the data anonymised?	Yes x	No ☐
		Do you plan to anonymise the data? Yes ☐	No* ☐
		Do you plan to use individual level data? Yes* ☐	No ☐
		Will you be linking data to individuals? Yes* ☐	No ☐
e.	Are the data sensitive (DPA 1998 definition)?	Yes* ☐	No x
f.	Will you be conducting analysis within the remit it was originally collected for?	Yes x	No* ☐
g.	**If no,** was consent gained from participants for subsequent/future analysis?	Yes ☐	No* ☐

h.	**If no,** was data collected prior to ethics approval process?	Yes ☐	No* ☐

* *Give further details in* ***Section 8 Ethical Issues***

If secondary analysis is only method used ***and*** *no answers with asterisks are ticked, go to* ***Section 9 Attachments.***

Section 7 Data Storage and Security

Please ensure that you include all hard and electronic data when completing this section.

a.	Confirm that all personal data will be stored and processed in compliance with the Data Protection Act 1998 (DPA 1998). *(See the Guidelines and the Institute's Data Protection & Records Management Policy for more detail.)*		Yes x
b.	Will personal data be processed or be sent outside the European Economic Area?	Yes ☐ *	No x

***If yes,** please confirm that there are adequate levels of protections in compliance with the DPA 1998 and state what these arrangements are below.

c. Who will have access to the data and personal information, including advisory/consultation groups and during transcription? Just myself

During the research

d. Where will the data be stored?

On my personal laptop and safesync storage space. The safesync platform includes 256-bit encryption, firewalling, and a partitioned network (the file servers are not publicly accessible). In addition, a permissions structure which requires specific permission to view a file is in place at SafeSync to guard against software bugs.

e. Will mobile devices such as USB storage and laptops be used? Yes x* No ☐

***If yes,** state what mobile devices: USB

***If yes,** will they be encrypted?: Yes

After the research

f. Where will the data be stored? On my personal laptop and safesync storage space. The saefsync platform includes 256-bit encryption, firewalling, and a partitioned network (the file servers are not publicly accessible). In addition, a permissions structure which requires specific permission to view a file is in place at SafeSync to guard against software bugs.

g. How long will the data and records be kept for and in what format? 10 years, electronically

h. Will data be archived for use by other researchers? Yes ☐ * No x

***If yes,** please provide details.

Section 8 Ethical issues

Are there particular features of the proposed work which may raise ethical concerns or add to the complexity of ethical decision making? If so, please outline how you will deal with these.

It is important that you demonstrate your awareness of potential risks or harm that may arise as a result of your research. You should then demonstrate that you have considered ways to minimise the likelihood and

impact of each potential harm that you have identified. Please be as specific as possible in describing the ethical issues you will have to address. Please consider / address ALL issues that may apply.
Ethical concerns may include, but not be limited to, the following areas:

- Methods
- Sampling
- Recruitment
- Gatekeepers
- Informed consent
- Potentially vulnerable participants
- Safeguarding/child protection
- Sensitive topics
- International research
- Risks to participants and/or researchers
- Confidentiality/Anonymity
- Disclosures/limits to confidentiality
- Data storage and security both during and after the research (including transfer, sharing, encryption, protection)
- Reporting
- Dissemination and use of findings

This study will be informed by the BERA (2011) guidelines, and data treated according to the Data Protection Act (1998). Participation will be voluntary and teachers will have the right to withdraw at any time.

I recognise that teachers may feel obliged to participate because they are taking part in the wider study, and because my organisation is providing the professional development. Study materials will clearly set out the differences between my research and the wider study (including my role as researcher) and make it clear that non-participation in the research will not affect wider study participation. I will use UCL letter-headed paper to make this distinction even clearer. However clearly I set this out, I know that my identity as 'professional development provider' as well as 'researcher' may influence how teachers respond within their interviews. This is not entirely negative – my in-depth knowledge of the professional development will be an advantage, for example – but must be acknowledged.

In terms of wider consent, I have the verbal consent of the Education Endowment Foundation (the funders of the wider study) to build this research into the project, but will also collect written consent and ensure transparency throughout. I will inform the schools' Head Teachers of my proposals, and how findings will be used.

Finally, I need to recognise a potential conflict arising from the fact I am the developer. This could bring bias in terms of a desire for the programme to be successful, leading me to seek research evidence supporting this conclusion. For this reason, I have focused my research on the development of an evaluation framework, and on exploring the *mechanisms* of changes in practice already being assessed, rather than on evaluating the impact of the programme per se.

Section 9 Further information

Outline any other information you feel relevant to this submission, using a separate sheet or attachments if necessary.

Section 10 Attachments Please attach the following items to this form, or explain if not attached

a.	Information sheets and other materials to be used to inform potential participants about the research, including approach letters	Yes x	No ☐
b.	Consent form	Yes x	No ☐
	If applicable:		
c.	The proposal for the project	Yes ☐	No ☐
d.	Approval letter from external Research Ethics Committee	Yes x	No ☐
e.	Full risk assessment	Yes ☐	No ☐

Section 11 Declaration

	Yes	No
I have read, understood and will abide by the following set of guidelines.	x	☐

BPS ☐	BERA x	BSA ☐	Other (please state) ☐

I have discussed the ethical issues relating to my research with my supervisor.	x	☐
I have attended the appropriate ethics training provided by my course.	x	☐

I confirm that to the best of my knowledge:

The above information is correct and that this is a full description of the ethics issues that may arise in the course of this project.

Name	Sandra Mathers
Date	20-11-16

Please submit your completed ethics forms to your supervisor.

Notes and references

Professional code of ethics
You should read and understand relevant ethics guidelines, for example:
British Psychological Society (2009) *Code of Ethics and Conduct*, and (2014) *Code of Human Research Ethics*
or
British Educational Research Association (2011) *Ethical Guidelines*
or
British Sociological Association (2002) *Statement of Ethical Practice*

Disclosure and Barring Service checks
If you are planning to carry out research in regulated Education environments such as Schools, or if your research will bring you into contact with children and young people (under the age of 18), you will need to have a Disclosure and Barring Service (DBS) CHECK, before you start. The DBS was previously known as the Criminal Records Bureau (CRB)). If you do not already hold a current DBS check, and have not registered with the DBS update service, you will need to obtain one through UCL.

Ensure that you apply for the DBS check in plenty of time as will take around 4 weeks, though can take longer depending on the circumstances.

Further references
The www.ethicsguidebook.ac.uk website is very useful for assisting you to think through the ethical issues arising from your project.

Robson, Colin (2011). *Real world research: a resource for social scientists and practitioner researchers* (3rd edition). Oxford: Blackwell.
This text has a helpful section on ethical considerations.

Alderson, P. and Morrow, V. (2011) *The Ethics of Research with Children and Young People: A Practical Handbook*. London: Sage.
This text has useful suggestions if you are conducting research with children and young people.

Wiles, R. (2013) What are Qualitative Research Ethics? Bloomsbury.
A useful and short text covering areas including informed consent, approaches to research ethics including examples of ethical dilemmas.

Departmental use		
If a project raises particularly challenging ethics issues, or a more detailed review would be appropriate, you may refer the application to the Research Ethics and Governance Administrator (via IOE.researchethics@ucl.ac.uk) so that it can be submitted to the Research Ethics Committee for consideration. A Research Ethics Committee Chair, ethics representatives in your department and the research ethics coordinator can advise you, either to support your review process, or help decide whether an application should be referred to the Research Ethics Committee.		
Reviewer 1		
Supervisor name	Iram Siraj	
Supervisor comments	We have discussed (in my view) all the ethical issues which might arise and I am convinced that the study is well thought through and participants will be treated fairly and ethically.	
Supervisor signature	Concealed	
Reviewer 2		
Advisory committee/course team member name	Phil Jones	
Advisory committee/course team member comments	I have reviewed the addition and am happy to approve it.	
Advisory committee/course team member signature	Concealed	
Decision		
Date decision was made	October 13 2017	
Decision	Approved	☒
	Referred back to applicant and supervisor	☐
	Referred to REC for review	☐
Recording	Recorded in the student information system	☐

Once completed and approved, please send this form and associated documents to the relevant programme administrator to record on the student information system and to securely store.

Further guidance on ethical issues can be found on the IOE website at http://www.ucl.ac.uk/srs/research-ethics-committee/ioe and www.ethicsguidebook.ac.uk

APPENDIX 5: Instructions for expert reviewers

OBSERVING LANGUAGE PEDAGOGY EXPERT REVIEW FORM

PRESENCE OF EXPERT PRACTICE: Watch one clip at a time. For each of the 30 strategies, please rate the extent to which you observe it **occurring in an effective manner** (e.g. executed with skill, appropriate for context) within the relevant video clip. A high score (5) indicates *effective* presence. This may involve consistent and appropriate use of a strategy throughout the clip, or one particularly salient and effective example of a strategy being used. A high score can be given if a strategy is used effectively/appropriately, even if the child does not pick on the cue. You might award a low score (1) if the behaviour in question does not occur in the clip, or if it does occur but is not well-executed or inappropriate.

IMPORTANCE FOR SUPPORTING ORAL LANGUAGE DEVELOPMENT: Please rate the extent to which expert practice in this domain would support children to develop their oral language skills. These ratings are entirely independent of the video clips (i.e. it does not matter whether the strategies listed appear in the clips or not). The aim of this exercise is to capture an expert's view (i.e. yours) on which of the 35 strategies listed below are **most important in supporting young children's oral language development** and which are least important. Some strategies may be crucial in supporting *other* aspects of children's development (e.g. social skills) but a high score should only be awarded if they *also* promote oral language skills.

	PRESENCE OF EXPERT PRACTICE 1 = low 5 = high			**IMPORTANCE** 1 = low 5 = high	**NOTES**
	CLIP 1 *Block Play*	**CLIP 2** Niaz's List	**CLIP 3** *Princess & Dragon*		
ADULTS MODELLING LANGUAGE FOR CHILDREN					
1. Modelling diverse, rich or specific vocabulary likely to extend the child					
2. Modelling diverse, rich or specific grammar likely to extend the child					
3. Simple modelling of language					
4. Linguistic expansion or recasting of children's utterances					
5. Emphasising, repeating or reinforcing language modelled for children					
6. Using descriptive, informative or narrative language for children to hear					
PROVIDING INFORMATION ABOUT WORD MEANINGS Providing temporally contingent clues to the meaning of specific words					
7. Providing explicit definitions of words					
8. Use of concrete gestures, pictures or props to support word meanings					
COMMUNICATION-FACILITATING INTERACTIONS Behaviours focused on prompting communication & engaging children in multi-turn conversations					
9. Engaging in conversation with children					
10. Implicitly inviting communication					
11. Explicitly inviting communication					
12. Encouraging children to use new or key vocabulary					
13. Listening, attending and responding					

14. Affirming the child's language by repeating it					
Semantic extension of children's utterances					
16. Supporting mutual understanding					
17. Supporting children to attend and participate					
COGNITIVELY CHALLENGING TALK Modelling, engaging in and encouraging talk of an abstract, de-contextualised nature (i.e. beyond the concrete and the here-and-now).					
18. Talking about or encouraging thinking					
19. Reasoning, prediction and inference					
20. Pretending, imagining and projecting					
21. Use of open questions					
POSITIVE RELATIONSHIPS AND CHILD WELLBEING Responsive behaviours which create positive adult-child relationships, and promote children's wellbeing and sense of self					
22. Positive affect or communication					
23. Individual attention and sensitive responding					
24. Promoting self-worth					
25. Using a non-directive approach					
26. Facilitating peer communication					
27. Facilitating peer interactions & relationships					
MEANINGFUL AND ENGAGING CONTEXTS FOR LANGUAGE-LEARNING Promoting language within contexts likely to be meaningful or interesting to the child					
28. Joint attention, and use of language contingent on the child's focus of attention					
29. Use of contexts likely to be engaging or meaningful for children – and use of language in these contexts					
30. Making connections					

ADDITIONAL COMMENTS

Please use this box to make any additional comments (e.g. strategies which you think are important for supporting oral language development but are not listed above, comments on the video clips, comments on the expert review process itself).

OBSERVING LANGUAGE PEDAGOGY EXPERT REVIEW:

DETAILED GUIDANCE ON ITEMS

ADULTS MODELLING LANGUAGE FOR CHILDREN	
1. Modelling diverse, rich or specific vocabulary likely to extend the child	e.g. introducing words likely to be new to children or above their current level; using a wide variety of different words; using uncommon, challenging, technical or domain-specific words
2. Modelling diverse, rich or specific grammar likely to extend the child	e.g. modelling grammar likely to be above children's current level, such as using sentences for children not yet using them, using multi-clause sentences or specific grammatical components (e.g. conjunctions, prepositions, comparatives, irregular verbs, pronouns)
3. Simple modelling of language	e.g. use of child-directed language which is appropriate and/or correct but which may not necessarily be diverse, rich or specific.
4. Linguistic expansion or recasting of children's utterances	Adult ***repeats child's utterance***, either adding vocabulary, grammar or information; correcting vocabulary or grammar; or recasting children's words into a different correct form (e.g. into a question, into a full sentence). Examples might include: • I went shop -> Yes, you went ***to the*** shop • I went to the shop to buy food -> Yes, you went to the ***supermarket*** to buy food • I wented to the shop -> Yes, you ***went*** to the shop • Him went to the shop -> Did **he** go to the shop?
5. Emphasising, repeating or reinforcing language modelled for children	e.g. emphasising or repeating new/key words or grammatical elements; use of contrasts to highlight differences in words or grammar *(e.g. big/bigger).* Note also that this item relates to language modelled by adults. Repetition of *children's* words is reflected in Item 14.
6. Using descriptive, informative or narrative language for children to hear	e.g. commenting or describing; providing information; commentary or narration of child's or adult's actions; modelling answers to questions; modelling peer communication (e.g. narrating one child's actions to another, modelling responses between children). The focus of this category is on modelling language about the present and about concrete activities (e.g. commentary on play, providing information about concrete topics). Modelling language relating to abstract concepts (e.g. meta-cognition, predicting, speculating, talk about past or future events, talking about how a character might feel) is reflected under Items 18-21 'Cognitively Challenging Talk'.
PROVIDING INFORMATION ABOUT WORD MEANINGS Providing temporally contingent clues to the meaning of specific words	
7. Providing explicit definitions of words	e.g. explaining the meaning of new words *('a sheepdog works on a farm and rounds up the sheep'),* using familiar words to define new words *('gigantic is another word for really big'),* providing examples of another sentence or context in which a new word might fit *('he was downcast – that means he was sad – when someone says something unkind to you, you might feel downcast'),* or repeating/reinforcing word meanings. This category also includes strategies to deepen understanding of word meanings, for example encouraging children to apply word definitions, or to construct their own examples; or offering extra conceptual information (e.g. describing the use of objects, giving examples of what is/is not part of the concept)

8. Use of concrete gestures, pictures or props to support word meanings	e.g. naming or labelling specific objects or actions *(e.g. using the word hammer when pointing to a hammer or picking up a hammer)*, using gestures to accompany words *(e.g. making hammering action when using the word hammer);* or introducing words while drawing pictures or using props. This category reflects the use of gestures/props to provide temporally contingent clues to the meaning of specific words. More general use of language in meaningful contexts (e.g. during play) is reflected in Items 28 to 30.
COMMUNICATION-FACILITATING INTERACTIONS Behaviours focused on prompting communication, and on engaging children in multi-turn conversations	
9. Engaging in conversation with children	This category reflects the value of conversation in its own right (i.e. does the adult engage in conversation with children?) Specific strategies to invite and support communication are reflected in the remainder of Items in this section (10 to 17).
10. Implicitly inviting communication	e.g. looking expectantly, or using gestures or other non-verbal cues to invite communication; being face-to-face/at children's height and using eye contact, allowing time and space for conversation
11. Explicitly inviting communication	e.g. use of questions, comments or prompts to begin conversation or encourage the child to respond; encouraging the child to describe or articulate what they are doing; completion prompts (e.g. pausing to allow the child to finish off a sentence the adult has begun); offering alternatives *('do we put our shoes or socks on first'?);* or encouraging peer communication (e.g. suggesting a child asks another child a question) Strategies which explicitly encourage children to use specific vocabulary are considered in Item 12 and should not be reflected here. Strategies which explicitly invite children to use abstract, de-contextualised language (e.g. encouraging children to articulate their thinking, use of open rather than closed questions) are considered under Items 18-21 and should not be reflected here.
12. Encouraging children to use new or key vocabulary	e.g. questioning to encourage child to use specific words, leaving a gap for child to supply a specific word, creating other opportunities (e.g. through role play activities) which encourage children to use specific words
13. Listening, attending and responding	e.g. engagement in the interaction, tuning in to the child, listening attentively, responding appropriately to the child's communication, using non-verbal cues (e.g. nodding) to affirm the child's response and scaffold the conversation, pausing to allow the child time for processing or response, supporting conversational turn-taking, encouraging children to listen to each other
14. Affirming the child's language by repeating it	i.e. repeating the child's words (which provides confirmation that they have been heard and understood, and affirms children's use of language)
15. Semantic extension of children's utterances	Adult expands or builds on what the child says ***without necessarily repeating their words,*** in order to extend the narrative or add new linguistic information (e.g. I've got a new dog -> How exciting! Has he got big floppy ears like Max?)
16. Supporting mutual understanding	e.g. using slow, clear speech and simple phrasing to support children's understanding; checking child's comprehension and adjusting own language accordingly (e.g. rephrasing a question to support the child to answer); sensitively seeking clarification or making an educated guess when child's language or intention is not clear

17. Supporting children to attend and participate	e.g. using expression or voice tone to engage children, using children's names to focus their attention, scanning the group to identify non-participating children
COGNITIVELY CHALLENGING TALK Modelling, engaging in and encouraging talk of an abstract, de-contextualised nature (i.e. beyond the concrete and the here-and-now). There is inevitable overlap between items 18-21. This is fine: simply record the extent to which each strategy occurs, even if you credit the same examples under multiple 'Cognitively Challenging Talk' items. However, note that this category relates only to cognitively challenging talk (e.g. about problem-solving, pretend talk with children) rather than to the contexts within which such talk takes place. Use of investigation, pretend play etc as meaningful or engaging contexts for promoting language is reflected in Item 29.	
18. Talking about or encouraging thinking	e.g. talking about or encouraging children to talk about thinking/meta-cognition *(e.g. 'I think when I get home I'll cook myself some soup for dinner'; 'How did you decide what do to?');* encouraging critical or deeper thinking; challenging or discussing ideas; sustained shared thinking; encouraging children to express their ideas
19. Reasoning, prediction and inference	e.g. modelling, engaging in or encouraging prediction, speculation, inference, problem-solving, reasoning or explanation (e.g. why or how things happen, cause and effect)
20. Pretending, imagining and projecting	e.g. encouraging the children to imagine, reading/telling a fictional story to children, pretend talk, projecting into the life of a character
21. Use of open questions	Use of open questions to promote talk in any context (may relate to interactions already reflected in other categories e.g. use of open questions to encourage thinking)
POSITIVE RELATIONSHIPS AND CHILD WELLBEING Responsive behaviours which create positive adult-child relationships, and promote children's wellbeing and sense of self	
22. Positive affect or communication	e.g. warmth, smiling, using a warm or calm voice, showing affection verbally or non-verbally, being playful and having fun with children, being welcoming to children
23. Individual attention and sensitive responding	e.g. giving individual attention to children, using children's names, interpreting children's needs and responding appropriately, providing help when needed.
24. Promoting self-worth	e.g. valuing, showing interest in or reacting positively to the children, their contributions and ideas; making the child the 'expert'; using praise or encouragement; using respectful language; allowing children ownership
25. Using a non-directive approach	e.g. allowing the child to try their own ideas, encouraging independence. The emphasis in this category is on the adult not being overly directive. Active engagement in the child's activities and interests (i.e. child-led learning) is considered under Item 28.
26. Facilitating peer communication	e.g. narrating one child's actions to another, modelling responses between children, suggesting a child asks another child a question, encouraging children to listen to each other. There will be some inevitable overlap with other items (e.g. Items 6, 11, 13).
27. Facilitating peer interactions & relationships	e.g. helping children to understand the feelings or intentions of others, supporting conflict resolution, social coaching, or encouraging collaboration.

MEANINGFUL AND ENGAGING CONTEXTS FOR LANGUAGE-LEARNING Promoting language within contexts likely to be meaningful or interesting to the child	
28. Joint attention, and use of language contingent on the child's focus of attention	e.g. engaging in the child's activities, play or interests; following children's lead; using language related to the child's focus of attention (i.e. their activities or interests); using children's ideas to develop discussion or story. Such joint attention provides a motivating language context, and minimises the cognitive processing needed for children to absorb language.
29. Use of contexts likely to be engaging or meaningful for children – and use of language in these contexts	e.g. use or provision of resources, activities or experiences likely to be engaging or meaningful for children (e.g. play, role play, block play, active play, stories, puppets, problem-solving, investigation, contexts likely to be within children's experience, concrete experiences); and the use/introduction of language within these contexts.
30. Making connections	e.g. making links to prior discussions or learning; making links between activities or areas of the curriculum; revisiting/repeating language or experiences at different times or in different contexts; providing follow-up opportunities for children to use new language in different contexts.

EVALUATING THE PEDAGOGICAL TERMINOLOGY USED IN OLP RESPONSES

I am analysing responses to the OLP video clips. Practitioners have listed, using their own words, the pedagogical strategies which they observe being used by the teacher in each video clip. I am assessing these responses to evaluate the level of pedagogical knowledge reflected by each response. An example response might be:

- *"Recasting the sentences that the child has said in a grammatically correct way"*

One obvious indicator of higher pedagogical knowledge is the extent to which practitioners can identify evidence-based strategies. A second possible indicator is the extent to which practitioners use specialist terminology to *describe* these strategies. Consider the following two examples:

- **PRACTITIONER 1***: "Adult encouraged use of de-contextualised language, for example explaining cause and effect relationships"*
- **PRACTITIONER 2***: "The adult encouraged the children to explain what was happening"*

These two responses are describing the same episode within the video clip, but use of the term *'de-contextualised language'* is an indicator that the first practitioner has specialised knowledge about oral language development and pedagogy (i.e. specialised pedagogical content knowledge).

Below are a number of different terms used in responses to the OLP video clips. I want to divide these into:

1. Terms which one might expect to be in reasonably common usage along early years teachers (i.e. indicating pedagogical knowledge but not *specialist* pedagogical knowledge); and
2. Terms which might indicate that a practitioner had *specialist knowledge* of language-supporting pedagogy and/or has attended previous oral language-specific professional development.

For each of the words below, **please tick** to indicate whether you think it is a term which might be used fairly commonly by early years teachers, or whether it indicates more specialist knowledge. The focus is on the use of specialist terminology used to *describe* pedagogical strategies, rather than on the identification of strategies themselves.

Pedagogical terms	**Term one might expect to be in fairly common useage among early years teachers**	**Likely indicator of specialist knowledge**	**Example of this term used in a response**
Questions			Asking **questions** to promote language
Open questions			Practitioner asks the child **open-ended questions** 'how could you make it go faster?'
Closed questions			Uses **closed questions** to prompt a response
Completion prompts			Leaving **completion prompts** for child
Prompting			**Prompting** the child to use language
Sustained shared thinking			Encouraging **sustained shared thinking**

Dialogue			Engaging in purposeful **dialogue**
Feedback			Giving **feedback** on child's language e.g. repeating to confirm that they have been understood
Recasting			**Recasting** the sentences that the child has said so that the grammar is correct
Remodelling			**Remodelling** the sentences that the child has said so that the grammar is correct
Grammar			Remodelling the sentences that the child has said so that the **grammar** is correct
Paraphrasing			Paraphrasing children's language
Utterance			Extending child's one word **utterance** to a simple phrase
Extending			**Extending** the one word utterance to a simple phrase
Scaffolding			**Scaffolding** language (I put this up/So you pulled it)
Vocabulary			Modelling and repeating key **vocabulary** e.g. steeper
Modelling			**Modelling** and repeating key vocabulary e.g. steeper
Terminology			Using correct **terminology** for child to hear
Meta-cognition			Modelling **meta-cognition** e.g. 'First I'm going to…..'
Talking about thinking			**Talking about thinking** while playing with the child
Talking about the future			**Talking about the future** with children
Commentary			Provides a **commentary** on the child's play
Descriptive commentary			Provides **descriptive commentary** on the child's play
Running commentary			Provides a **running commentary** on the child's play
Running narrative			Provides a **running narrative** on the child's play
Narrative			Provides a **narrative** on the child's play
Self-talk			**Self-talk** about what is happening
Pole bridging			Using **pole bridging** to describe what is happening
Recapping			**Recapping** on what has happened for children
Commenting			**Commenting** on what he could write - suggesting vocabulary
Explaining			**Explaining** new words
Definitions			Provide explicit **definitions** of new words
Makaton			Using **Makaton** signing
Gesture			Using **gesture** to support new words & concepts - steep
Social coaching			Using **social coaching**

APPENDIX 6: Full OLP Coding Framework

SECTION 1: THE STRATEGY SCORE

The majority of responses will be assigned to only one strategy code. However, where responses clearly reflect two or more strategies, **double or even triple-coding** can be applied. When deciding on a category, raters should ask themselves what the response tells them about a teacher's understanding of the language-supporting strategies. For example, a respondent offering the answer "*narrative at child level using gestures and props*" clearly understands the importance of modelling events and actions (narration – **ITEM 6**), of placing oneself at child height (**ITEM 10**) and of using concrete clues to meaning **(ITEM 9**). See the example below:

Response	Strategy code 1	Strategy Code 2
Modelling vocabulary e.g. cuboid	3: Simple modelling of language	
Extending the child's grammar by introducing comparatives and repeating them	2: Modelling diverse, rich or specific grammar likely to extend the child	5: Emphasising, repeating or reinforcing language modelled for children
Making comments and extending children's responses	11: Inviting communication: *verbal*	4: Linguistic expansion or recasting of children's language
Running commentary on child's actions	6: Using descriptive, informative and narrative language in concrete contexts	
Repeating the child's words to confirm and give feedback	14: Affirming the child's language by repeating it	
Eye contact	10: Inviting communication: *non-verbal*	
Listening to child and valuing her ideas	13: Being a responsive conversation partner	24: Promoting children's self-worth
Uses open questions	21: Use of open questions	

Even with the coding guidance, it may sometimes be difficult to decide between categories. Given the inter-connected nature of language-supporting pedagogy, there is often a degree of overlap between categories. When coding responses, it is most important to assign responses correctly to the overall category (eg. modelling language, facilitating communication). Assignation to individual items within sub-categories is still important, but less so, and raters should apply a degree of '**best-fit' decision-making**.

In some cases, responses may not provide adequate information to assign a category. Common examples of such responses include 'questions' or 'repetition'. Such responses should be coded as **NON-SPECIFIC (99).** A small number of responses will be uncodeable **(CODE 0).** Guidance is provided throughout on which responses are uncodeable, or should be coded as 'non-specific'.

Where **examples** are provided, these can be used to support categorisation. For example:

- *"Scaffolding language (I put this up/So you pulled it)":* scaffolding language would usually be coded as **NON-SPECIFIC (99).** However, since the example clearly refers to an example from the vignette of the adult expanding/recasting the child's words, this response can be coded to **ITEM 4.**
- *"Visual cues (push, hands, sleep)*": a response stating simply 'visual cues' would be coded as **NON-SPECIFIC (99).** However, since the example clearly refers to instances in the vignette of the adult using gestures to support vocabulary, this response can be coded to **ITEM 8.**

In order to use the examples to support assignation, **the response must be explicit about the strategy being used**. A response which stated simply *"I put this up/so you pulled it"*" or "*push, hands, sleep"* would be coded as 0. Similarly, the response "*vocabulary - steeper, heavier, cuboid"* should be coded to ITEM 3 (simple language modelling) rather than to ITEM 1 (modelling diverse, rich or specific vocabulary). Even though rich vocabulary has been listed, the respondent has not explicitly noted that the vocabulary being used is rich or specific. We cannot therefore be sure that s/he understands the importance of using rich or specific vocabulary in supporting children's language development.

In some cases, it may also be possible (or even necessary) to use contextual information about the Vignette content when interpreting a response. For example, when deciding whether to code a reference to 'explanation' under **ITEM 19** (prediction, speculation, reasoning, explanation and inference) or under **ITEM 6** (modelling descriptive, information or narrative language for children). In Vignette 1, the adult both provide cause-and-effect explanations, and encourages the child to do so. It would therefore be reasonable to code the response 'asking child to explain what is happening' as ITEM 18. This is also true of Vignette 3 (e.g. How does he get in? – asking how the dragon might get into the castle), so 'asking children to explain' could feasibly be coded under Item 18. However, explanation is not a feature of Video 2, so references to explanation are more likely to be referring to narration or description (Item 6).

For detailed guidance on how to code responses referencing **questions,** see **ITEM 11.**

ADULTS MODELLING LANGUAGE FOR CHILDREN

1. Modelling varied, rich or specific VOCABULARY likely to extend the child

e.g. introducing words likely to be new to children or above their current level; using a wide variety of different words; using uncommon, challenging, technical or domain-specific words

CODE TO ITEM

Responses including key words which indicate that the practitioner is introducing new, specific, varied or rich vocabulary. For example:

- New vocabulary or words
- Introducing, adding, giving, providing 'feeding children' vocabulary/words
- Challenging, specific, technical, specialist vocabulary/words
- Varied, extensive, range of, different, rich, diverse vocabulary/words
- All responses which reference terminology *(reference to rich/specific not needed as this is inherent in the term)*
- Extending, extended, expanding vocabulary *(unless response is explicit about repeating or recasting the child's words – see right)*
- ***Examples might include: adding vocabulary, introducing new words, using technical words, uses appropriate terminology, extending vocabulary***

Responses which reference domain-specific language, for example:

- The vocabulary of length, shape, maths, emotion ***(e.g. uses emotion words)***
- The language of length, shape etc ***(e.g. modelling the language of shape)***

CODE ELSEWHERE

Examples of vocabulary, if the specificity/richness has not been made explicit. For example, *"vocabulary e.g. cuboid"* would be coded under **ITEM 3** (simple modelling)

References to **quantity of vocabulary** *e.g. "lots of vocabulary"* - code under **ITEM 3.**

The **vocabulary/language of position, time, ordering or story**. This implies prepositions or adverbs e.g. behind, next, after. Code under **ITEM 2.**

Responses which imply **extension of vocabulary <u>used by the child</u>** should be coded under **ITEM 4** (linguistic responsivity). Examples might include '*repeating, then extending vocabulary*', which implies that the child's words have been repeated. The distinction between Items 1 and 4 is a fine one, and it may be possible to tell with certainty which strategy a particular response reflects. Responses which state simply **'extending, expanding or expansion'** should be coded as **NON-SPECIFIC.**

General responses to **developing, encouraging, promoting or supporting** vocabulary should be coded as **NON-SPECIFIC,** if no other detail is provided.

Do not code references to **correct vocabulary** here. See notes in **ITEMS 3 & 4.**

EXAMPLES OF DOUBLE CODING

- *"new language and vocabulary"* **–ITEM 1+3**

ITEM 1+8:

- *"introduces words and <u>explains using gesture</u>"*
- *"introduces words <u>while referring to objects</u>"*
- *"introducing <u>the name of items drawn</u>"*

ITEM 1+29:

- *"new words <u>in context</u>"*
- *"introduces new words <u>through play</u>"*

2. Modelling varied, rich or specific GRAMMAR likely to extend the child

e.g. using sentences for children not yet using them, using multi-clause sentences or specific grammatical components (e.g. conjunctions, prepositions, comparatives, irregular verbs, pronouns)

CODE TO ITEM

Responses including key words which indicate that the practitioner is introducing new, specific, varied or rich grammar. For example:

- New grammar/grammatical structure
- Introducing, adding, giving, providing, 'feeding children' grammar etc
- Challenging, varied, extensive, rich, diverse, specific grammar etc

Responses which reference specific grammatical elements, for example:

- Connectives, conjunctions, adjectives, pronouns, prepositions, verbs, adverbs, tenses, comparisons/comparative language, sentences
- Language of ordering/position/ time
- *(Using)* story language or vocabulary
- Responses which are explicit about the modelling of questions

Examples: conjunctions, modelling correct comparative language, models speaking in a sentence, models time words to sequence thinking

See right on responses which refer to *adding* these elements eg."adding tenses"

CODE ELSEWHERE

Responses which give **examples of grammatical elements** but which do not name them, or which refer to them as vocabulary (e.g. *"models new language e.g. next",* or *"adding vocabulary – faster"*) should be coded under **ITEMS 1 or 3** as appropriate.

Responses which imply **extension of grammar used by the child** should be coded under **ITEM 4** (linguistic responsivity). Examples might include *'repeating the child's language in full sentences'.* The distinction between Items 1 and 4 is fine, and it may not always be possible to tell with certainty which strategy a particular response reflects. Responses which state simply **'extending, expanding or expansion'** should be coded as **NON-SPECIFIC.**

General responses to **developing, encouraging, promoting or supporting** grammar should be coded as **NON-SPECIFIC** if no other detail is provided.

Do not code references to **correct grammar** here. See notes in **ITEMS 3 & 4.**

EXAMPLES OF DOUBLE CODING

- *"new vocabulary used in a sentence"* – **ITEM 2+1**
- *"modelling language and sentences"* - **ITEM 2+3**
- *"storytelling using ideas from the children, modelling sentence construction"* - **ITEM 2+15+28**

Do not double-code (focus is on grammar):

- *"using time words to extend narrative: after"*
- *"time words to sequence thinking"*

3. Simple language modelling

Language which is appropriate and correct but which may not necessarily be diverse, rich or specific. A general category for responses which reference the modelling of vocabulary/grammar but do not reference the richness of language, and responses which reference the modelling of rich language but are not specific about the kind of language modelled (i.e. vocabulary, grammar)

CODE TO ITEM

Responses which reference the modelling of vocabulary/grammar but do not reference the richness of language (so cannot be coded under Items 1/2)

- Modelling vocabulary, grammar, language, phrases, answers, responses…
- Using, showing, naming, demonstrating, 'radiating', exposing children to, suggesting, providing opportunities for children to bump into vocabulary etc
- Key/appropriate vocabulary etc
- Modelling correct *(use of)* vocabulary etc *(but see also right)*
- Vocabulary or grammar + appropriate example (e.g."*vocabulary-steep")*
- Child-directed speech/talking alongside the child

CODE ELSEWHERE

Do not credit if no further detail provided:

- Language/words
- Radiator/bump words
- Correction *(see also below)*

Code as NON-SPECIFIC if no other detail provided:

- Modelling or naming
- Vocabulary, grammar/grammatical structure, narrative skills
- Extending, expanding, expansion
- Developing, encouraging, promoting, supporting language, vocabulary etc
- Correct language etc *(see also below)*

EXAMPLES OF DOUBLE CODING

Most responses should be coded EITHER to codes 1/2 OR to code 3. Exceptions would include e.g. *'modelling language and sentences'* (**ITEMS 2 & 3**).

Other examples:

- *"models language and thinking"* – **ITEM 3+18**
- *"engages in discussion and models responses"* - **ITEM 3+9**

Responses including key words which indicate that the practitioner is introducing new, specific, varied or rich language. For example: • New • Introducing, adding, giving, providing, 'feeding children' • Challenging, rare, uncommon • Varied, extensive, range of, different, rich, diverse • Specific, technical, specialist • Extending, extended, expanding language *(unless response is explicit about repeating or recasting the child's words – see right)*	**Correcting.** Responses which refer to modelling correct (use of) language, vocabulary etc can be coded here. For other references to correcting, see notes in Item 4. Responses which imply **extension of language used by the child** should be coded under **ITEM 4** (linguistic responsivity). Examples might include *'repeating the child's language and expanding'.* The distinction between Items 1 and 4 is fine, and it may not always be possible to tell which strategy a particular response reflects. **Responses which state simply 'extending, expanding or expansion'** - code as **NON-SPECIFIC.**	• *"commenting on what he could write and suggesting vocabulary"* **– ITEM 3+11** **ITEM 3+29:** • *"new language in context"* • *"new language through play"* • *"introduces language related to the activity"*

4: Linguistic expansion or recasting of children's language

Adult repeats child's utterance and adds or corrects vocabulary, grammar or information; or recasts children's words into a different correct form (e.g. into a question or a full sentence)

CODE TO ITEM

References to repeating the child's language and adding/correcting, for example:

- Repeating and adding detail/repeating back correctly/repeating after child fixing grammar
- Repeating and rephrasing
- *Entries should not be double-coded with Items 1-3 (modelling) or Item 14 (repeating child's words)*

References to extension, rewording or rephrasing of the child's language, for example:

- Extending, expanding, rewording or rephrasing the child's language [vocabulary, grammar etc]
- Extending [etc.] the child's phrases/ sentences *(but see right re: responses, comments)*

References to correcting the child's language, for example:

- Correcting child's use of vocabulary/modelling correct language when child makes a mistake etc
- *'Correct vocabulary [language etc]* + a specific example of linguistic extension from the clip e.g. *"models correct vocabulary – pencils"*

Other valid responses:

- Recasting/remodelling
- Scaffolding vocabulary or grammar *(but not 'scaffolding language – see right)*
- Other response which provides a clear example of recasting from the video *(e.g. repeated back, she for he; models correct language – pencils)*
- Provides feedback on children's language (must include explicit reference to child)
- References to **adding or extending specific grammatical elements** (*e.g. adding word endings, tense or syntax; adding new words to phrases; extending sentence structure)* can be coded here without specific reference to repeating child's words, since this implies a recast. Also *'extending sentence structure'*. However, "*adding vocabulary*" would be coded under **ITEM 2.**

CODE ELSEWHERE

Responses which reference extending/expanding vocabulary, grammar or language **without referencing the child's language (**e.g. *"extended vocabulary")* should be coded under **ITEMS 1-3** as appropriate. Responses which state simply **'extending, expanding or expansion'** should be coded as **NON-SPECIFIC.**

Code as NON-SPECIFIC if no other detail provided:

- Extending, expanding, expansion
- Rewording or rephrasing *(with no ref. to child's language)*
- Scaffolding/scaffolding language
- Feedback *(with no reference to language)*

With **responses referencing 'correct'** it can be hard to tell whether they refer to modelling accurate language, or to temporally contingent linguistic expansion:

- 'Correction' or 'correcting' alone – **DO NOT CODE.**
- 'Correct language', 'correct vocabulary' etc – **NON-SPECIFIC**
- 'Modelling correct (use of) language, vocab etc' – **ITEM 3**

Extending or expanding phrases, sentences, responses, comments, ideas: the line between semantic and linguistic extension is a fine one. Code references to extension of phrases and sentences here, but references to extension of responses, comments or ideas to **ITEM 15** and references to extension of **thinking** to **ITEM 18.**

EXAMPLES OF DOUBLE CODING

Most responses will be coded EITHER to codes 1-3 or to code 4, unless both are explicitly referenced *(e.g. "models new language and extends the child's sentences"*

Other examples:

- *"extending phrases and comments"* – **ITEMS 4+15**
- *"sensitive feedback on language"* – **ITEMS 4+23**

5. Emphasising, repeating or reinforcing language modelled for children

CODE TO ITEM

References to:

- Repeating or reinforcing words, grammar or language
- Repetitive language
- Provide repeated opportunities for children to 'bump into'/hear/be exposed to words
- Emphasising words or grammar
- Uses contrasts to highlight differences between words/grammatical elements

References to use of **emphasis, intonation, expression or tone,** if their use to support meaning is explicit e.g. ***'expression to make meaning of words clear' or 'changing tone of voice to help children understand'.***

CODE ELSEWHERE

This category relates to **language modelled by adults** rather than repetition of children's words, and mainly to **vocabulary/grammar** rather than narrative:

- references to **recapping or summarising** events which have just occurred (e.g. *'recapping on what has happened'*) – code to **ITEM 6**
- references to supporting children to **retell** a story – code to **ITEM 15**
- references to **revisiting narrative** in different contexts (e.g. '*repeating story narrative at different times of day'; links story to play*) - **ITEM 30.**

References to **repeating word meanings/definitions** - code to **ITEM 8.**

References to **non-verbal techniques** such as facial expressions, gestures, body language and so on are considered under **ITEM 9.**

Code as NON-SPECIFIC if no other detail provided:

- Repetition/repeating (of language)
- Reinforcement/reinforcing
- Emphasis, intonation, expression, tone, facial expression

EXAMPLES OF DOUBLE CODING

Responses should not be double-coded with **ITEMS 1-4** unless they are explicit about introducing *and* repeating new words. The following could be double-coded:

- *"reinforcing new words and modelling them"* – **ITEM 5+1**
- *"using new vocabulary repeatedly"* – **ITEM 5+1**
- *"the teacher is using key vocabulary such as slower, faster, steep, further, and continually repeats this vocabulary"* – **ITEM 5+3**

Other examples:

- *"introduces language in context and repeats"* – **ITEMS 5+3+29**
- *"repeating vocabulary clearly"* – **ITEMS 5+16**
- *"reinforcing language and checking child's understanding"* – **ITEM 5+16**
- *"creating repeated opportunities for children to bump into words throughout the day"* – **ITEM 5+30**
- *"reinforcing words in different contexts"* – **ITEM 5+30**

6: Using descriptive, informative & narrative language in concrete contexts

e.g. describing, providing information, descriptive commentary or narration of child's or adult's actions; modelling answers to questions; modelling peer communication

CODE TO ITEM

References to:

- Describing
- Informing, providing information, *(e.g. on play, child's activities etc)*
- Narrating, narrative, modelling narrative, using/providing narrative
- Running commentary, descriptive commentary
- Pole-bridging or self-talk (*NB: may refer to narration of actions – coded here - or thoughts/feelings – coded under Item 18. Use context to decide).*
- Summarising/ recapping *(e.g. on events, what has happened, what the child has done)*
- Talking through what the child is doing

CODE ELSEWHERE

- **(Using) story language/vocabulary** – **ITEM 3**
- **Comments/commenting** – **ITEM 11**
- References to **developing, building on, continuing** a narrative/story or supporting children to **retell a story** – **ITEM 15**
- Modelling **fictional narrative** - **ITEM 20**
- Modelling **higher-order language** (*e.g. thinking, meta-cognition, speculating, predicting, explanations which clearly relate to cause-and-effect, talking about feelings or motivations)* – **ITEMS 18-20.**

DOUBLE CODING

Since the focus of this item is on modelling language in concrete contexts, most responses should not be double-coded with **ITEM 29** if they simply refer to narration of ongoing activities (e.g. *"adding a narrative to play"*). Only double-code when the response implies that the adult is actively modelling the actions for the language they use (e.g. "*describing the steps to make a list then modelling it*")

• References to explaining which do not refer to or imply a higher-level explanation of cause-and-effect (e.g. *"explaining what they are going to do*" in response to Vignette 2) • References to comments/commenting which clearly imply narration (*e.g. "commenting: giving descriptions of what is happening"* or *"comments: narrating what the child is doing").* Most references to comments will be coded under ITEM 11 (see right) • Other responses which clearly refer to modelling narrative eg. *"keeps repeating what the children are actually going to do"* or "*talking through the method"*	• References to **revisiting a story/narrative** in different contexts (e.g. "*repeating story narrative at different times of day", " links story to play"*) - **ITEM 30.** • **Narrative skills** – code as **NON-SPECIFIC**	**Examples of double-coding:** • *"narrative using gesture and props"* – **ITEM 6+8** • *"supporting the children to communicate with each by narrating"* – **ITEM 6+22** • ITEM 30: Only double code if both are explicit (e.g. 'narrates story for children and then revisits it in different contexts'

PROVIDING EXPLICIT INFORMATION ABOUT WORD MEANINGS - temporally contingent clues to the meaning of specific words

7: Providing explicit definitions of words

This might include: **explaining the meaning of new words** *('a sheepdog works on a farm and rounds up the sheep')***; providing examples of another sentence or context in which a new word might fit** *('he was downcast, that means he was sad - when someone says something unkind, you might feel downcast');* **encouraging children to apply word meanings** *(e.g. 'asks the child "when might we feel 'excited?"')***; or deepening understanding of word meanings by providing additional conceptual information** (e.g. what is or is not part of a concept *'a butterfly is different to a moth',* giving extra information about a concept '*meerkats live in the desert',* or describing the use of objects *'you use a hammer to knock in nails')*

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
Responses which explicitly reference word definitions or meanings, for example: • Defining (new) words [vocabulary, terminology, concepts etc] • Explaining (meaning of) (new) words etc • Offering information about words/word meanings *(NB: could be non-verbal but code here rather than Item 9)* • Repeating or reinforcing word meanings or definitions • Modelling words in different contexts or sentences/using familiar words to help children understand meaning/ deepen understanding of meaning **Responses which reference support for wider understanding of concepts reflected by words (see also right), eg:** • Describing the use of/encouraging children to think about use of objects/ asking what objects are used for • Asking a child to apply word meanings (e.g. *'getting her to show her what slow/fast looks like')*	This item overlaps with **ITEM 18** (promoting thinking). Most items will be coded to either Item 7 or 18. For example, "*repeats vocabulary and explains concepts"* explicitly connects vocabulary and concepts, so should be coded here. *'Supports understanding of key concepts' or 'challenging new concepts by talking them through with the child'* should be coded to Item 18 because the focus is on conceptual understanding rather than vocabulary. Responses referencing non-verbal clues to meaning should be coded under **ITEM 8** (*e.g."defines vocabulary using actions"*)	• *"using lots of vocabulary and providing definitions*" **– ITEM 7+3** • *"rephrasing to make the meaning clearer (further->longer)"* **– ITEM 7+16** • *"encouraging children to think about the use of objects"* – **ITEM 7+18** • *"explaining meaning in context"* – **ITEM 7+29**

8: Providing concrete clues to meaning *(e.g. gestures, pictures, props)*:
Might include naming or labelling specific objects or actions *(using the word hammer when pointing to a hammer or picking up a hammer),* using gestures to accompany words *(making hammering action when using the word hammer);* or introducing words while drawing pictures or using props

CODE TO ITEM

This category reflects the use of gestures/props to provide temporally contingent clues to the meaning of specific words**. The clearest responses will be specific**, e.g: '*supporting meaning using gestures'*, '*introducing new words while showing props/objects.*

The following can be coded without explicitly referring to vocabulary or meaning:

- Gestures, (hand) actions, motions or movements
- Signing/Makaton

The following fulfil several intentions but can be credited here <u>if responses explicitly reference words/meaning:</u>

- Props, picture props, picture prompts, drawings pictures
- Non-verbal or visual cues/clues/prompts; body language; facial expression

Examples include 'uses expressions to show meaning', 'non-verbal clues to support words'; 'visual clues to reinforce language'; 'drawing pictures to aid understanding'. Occasionally, context or examples provided by the respondent can be used to infer a focus on clues to meanings ***(e.g., 'describing the child's actions while she plays, giving her visual cues').***

Other valid responses:

- Demonstrating meaning
- Naming or labelling objects or actions/ linking (*words, language*) to objects

CODE ELSEWHERE

References to **props, picture props, picture prompts, drawings pictures** etc with no explicit reference to meaning – **ITEM 29**

References to **non-verbal or visual cues/clues/prompts; body language; facial expression** with no explicit reference to meaning:

- Code as **NON-SPECIFIC** if no further detail provided
- If detail is provided, code as appropriate, e.g.
  - *'uses expression to show meaning'*- **ITEM 5**
  - *'open body language'* - **ITEM 10**
  - '*engages children using expression in voice'*- **ITEM 17**

Responses referring more generally to **use of language in meaningful contexts** (e.g. 'using language during play to make it meaningful') should be coded to **ITEM 29.**

EXAMPLES OF DOUBLE CODING

With ITEMS 1-7 (references to introducing new language with gestures), only double code when the response cites modelling vocabulary **<u>and</u>** supporting this with gesture, e.g. *"introduces words and explains using gesture"* **(ITEMS 8+2)**

Where responses such as *"gestures/body language"* or "uses gestures and facial expressions" are coded to Item 8 they should <u>not</u> also be coded as **NON-SPECIFIC** (i.e. for body language or facial expressions).

FACILITATING COMMUNICATION AND CONVERSATION

Behaviours focused on inviting communication, engaging children in multi-turn conversations and supporting them to be successful communicators

9. Engaging in conversation with children

CODE TO ITEM

Simple references to engaging children in conversation:

- *(Engaging in/creating a culture of)* conversation, dialogue, discussion
- Supporting/maintaining/scaffolding conversation or conversation skills

CODE ELSEWHERE

Do not credit if no further detail provided:

- Communication
- Language
- Interacting/maintaining interaction

EXAMPLES OF DOUBLE CODING

- *"engages in discussions and models responses"* – ITEM 9+3
- *"observing child's play, giving child thinking time, having conversations"* – **ITEMS 9+13+23**

10: Inviting communication: non-verbal strategies

e.g. allowing time and space for conversation; making eye contact; using gestures, body language or expressions to invite communication

CODE TO ITEM

The focus in this item is about signalling availability for, and openness to, communication. The interactive nature of conversation (e.g. listening and responding to the child, supporting back-and-fore exchanges) is reflected in Item 13.

The following responses can be coded to Item 10 without an explicit reference to inviting communication:

- Being face-to-face/making eye contact
- Being at child height or level

The following can also be coded here if the response explicitly references engaging children or inviting communication:

- Gestures, actions, motions etc
- Non-verbal cues, clues or prompts; visual cues, clues or prompts
- Body language
- Expression, tone, intonation, use of voice, facial expression

Examples might include ***'body language to prompt communication'; 'gestures to encourage response'.***

Other valid responses:

- Being 'open for business' or being a 'magnet' for communication/conversation/talk etc
- Being receptive to/inviting communication etc
- Being/making one's self available for communication etc; allowing time/space for communication etc
- Looking expectantly
- Using open/positive/inviting body language

CODE ELSEWHERE

Gestures, actions, motions etc can be coded to **ITEM 8** if no further detail is given.

Code as NON-SPECIFIC if no other detail provided:

- Emphasis, intonation, expression, tone
- Facial expression
- Non-verbal cues, clues or prompts; visual cues, clues or prompts
- Encouraging communication, talk, speech, language
- Keeping focus
- Maintains children's focus/attention

Do not credit if no further detail provided:

- Communication
- Language

EXAMPLES OF DOUBLE CODING

- *"narrative at child level using gestures and props"* **– ITEM 10+6+8**
- *"using eye contact and smiling"* – **ITEM 10+22**
- *"showing interest in child amd being open for business"* **– ITEM 10+24**
- *"joining their play at their physical level"* **– ITEM 10+28**

11: Inviting communication: verbal strategies

e.g. questions, comments or prompts to begin the conversation or prompt further response from the child; encouraging the child to describe or articulate what they are doing; pausing so the child can provide a word or finish off a sentence started by the adult (completion prompts); offering alternatives *('do we put our shoes or socks on first'?);* explicitly prompting peer communication

CODING GUIDANCE

Questions

Questions are a key means of inviting communication from the child but can fulfil a multitude of purposes, and potentially be coded to many difference OLP items. Responses which simply cite 'questions' should be coded as **NON-SPECIFIC**. Where further detail is provided, code responses referencing questions or open questions as follows:

- modelling questions - **ITEM 2**
- to invite/encourage communication, encourage the child to communicate/provide information/clarify etc - **ITEM 11 (this item)**
- to prompt vocabulary (e.g. "uses 'missing word' questions) - **ITEM 12**
- to engage children or focus their attention - **ITEM 17**
- to develop a narrative/continue the story etc - **ITEM 15**
- to elicit understanding/clarify the child's meaning, rephrasing questions to support the child to answer - **ITEM 16**
- to encourage or extend thinking - **ITEM 18**
- to prompt and extend explanations (in the context of cause-and-effect) - **ITEM 19**
- references to open questions without any further detail **- ITEM 20**

Other valid responses

- **Comments/commenting**: although comments both model language and prompt communication, the majority of references to comments should be coded to Item 11. The exception are references which clearly imply narration (*e.g. "commenting - giving descriptions of what is happening")* – code these to **ITEM 6**
- **Comment then a question**
- **Prompts**/prompting *(the child)*
- References to **completion prompts** (e.g. "*unfinished sentences", "leaving time for child to fill in the blanks"* etc) unless they explicitly reference vocabulary (e.g. *"leaving space for the child to supply the missing words"*), in which case they should be coded to **ITEM 12.**
- Encouraging the child to **describe, clarify, talk about, provide information, respond, comment, articulate**
- Encouraging the child to **explain** *(where this does not relate to a higher-order explanation. Encouraging higher-order explanations* – **ITEM 19)**
- Encouraging children to **use** (*new)* language

Techniques which can be credited if the response explicitly references their role in inviting communication:

- Modelling language *(e.g. to encourage the child to respond)*
- Giving examples, providing options, offering alternatives *(e.g. to encourage child to give ideas)*

CODE ELSEWHERE

CODE AS NON-SPECIFIC (if no further information given):

- Giving examples, providing options, offering alternatives
- Questions
- Developing, encouraging, promoting or supporting language/ communication/ talk
- Creating (repeated) opportunities for children to use (new) language

DO NOT CREDIT (if no further information given):

- Encouragement
- Possibilities

EXAMPLES OF DOUBLE CODING

Encouraging use of story language in play 30
Question and response, listening and responding

•

commenting and extending children's responses 15

12: Inviting communication: vocabulary - explicit encouragement for children to retrieve and rehearse vocabulary

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
Responses which explicitly reference the prompting of vocabulary: • Questioning/prompting to extend, prompt, or provide opportunities to use vocabulary/words • Leaving gaps for the child to provide the (*missing)* vocabulary or words/using completion prompts to encourage child to use vocabulary etc • Encouraging child to use new [correct, specific] vocabulary etc *(e.g. to answer questions)*	Responses which do not explicitly reference vocabulary should be coded elsewhere as appropriate **Code as NON-SPECIFIC (if no other detail provided):** • Developing, encouraging, promoting or supporting vocabulary/words • Creating opportunities for children to use new words *(cannot tell whether this is explicit or through environmental opportunities)*	

13: Being a responsive conversation partner

e.g. listening, attending and responding; pausing to allow the child time for response; supporting conversational turn-taking; making an educated guess when child's language or intention is not clear so that the flow of conversation is not interrupted. This item reflects techniques which facilitate the *interactive* nature of adult-child conversation.

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
References to responsive conversation partner techniques: • Listening/attending *(e.g. to the child, to the child's ideas)* • Responding/reciprocating *(e.g. to communication, to non-verbal communication, to the child)* • Being a responsive language or conversation partner, active listening • Modelling conversation skills • Giving child time to answer [respond, talk, think, process] • Observe, Wait and Listen (OWL) – double-code with **ITEM 23** • Allowing the child to lead the conversation *(allowing the child to lead activities, play, interactions etc – see right)* • *(Encouraging)* turn-taking *(NB: allow even if the response does not explicitly reference conversation)* • Interpreting/guessing what the child says when speech is unclear **The following techniques can be coded here if the response explicitly references their role in facilitating conversation *(e.g. to show that the adult is listening, to scaffold or support conversation, to prompt children to take another turn etc):*** • Gestures, actions, motions etc • Non-verbal cues, clues or prompts; visual cues, clues or prompts, body language • Facial expression, expression, tone, intonation, use of voice • Repeating children's words **Examples might include *'uses body language and gestures to scaffold conversation'; 'nodding to reaffirm child's communication'*.** If the stated purpose does not relate to responsive conversation, code elsewhere as appropriate (e.g., code *'engages children using expression in voice'* to Item 17). If no supporting information is provided code gestures etc under **ITEM 8**; non-verbal clues, body language, facial expressions, expressions/intonation etc as **NON-SPECIFIC**; and repeating children's words as **14.**	Encouraging children to talk/listen to each other – **ITEM 26** Allowing the child to lead activities, play, interactions – **ITEM 28** **Do not credit if no further detail:** • Communication • Language • Interacting • Being/remaining engaged **Code as NON-SPECIFIC (if no other detail provided):** • Conversation skills • Scaffolding/scaffolding language • Developing, encouraging, promoting or supporting language/communication/talk • Repetition/repeating	References to **positive** or **enthusiastic** responses can also be coded to **ITEM 22.** References to **attentive or careful listening or responding** can also be credited in **ITEM 23.** **Observe, Wait and Listen OWL** is a communication-supporting strategy promoted by the Hanen Centre – double-code with **ITEM 23**

14. Affirming the child's language by repeating it

CODE TO ITEM

References to:

- Repeating what the child is saying/has said
- Repeating (words, phrases, language) back to the child
- Mirroring, copying or imitating the child's/the child's language/what the child says
- Confirming back

CODE ELSEWHERE

Code as NON-SPECIFIC (if no other detail provided):

- Repetition/repeating (of language)
- Reinforcement/reinforcing
- Confirming

EXAMPLES OF DOUBLE CODING

- *"repeat to reinforce/model, then rephrase"* – **ITEM 14+4**
- *"running commentary, repeating what a child says to confirm"* – **ITEM 14+6**
- *"listening to child, repeat what they have said"* – **ITEM 22+13**
- *"enthusiastically repeating his ideas back to him"* – **ITEM 14+22**

15: Extending conversational or narrative content (semantic extension)

Semantic extension of the child's contributions to extend the conversation or narrative and add new linguistic information

CODE TO ITEM

The focus here is on extending the content of the conversation, story or narrative to add new linguistic information, and on building a narrative together with children. Item 5 focuses on adding linguistic information to children's utterances. Modelling concrete narrative is considered in Item 6 and modelling fictional narrative in Item 20.

References to extending/expanding……

- The **conversation, story, talk, narrative, dialogue or discussion**
- Children's **responses or comments** *(see also right)*

References to expanding **on** or building **on** children's **responses, comments, answers, ideas, thoughts** (see right)

Other valid responses:

- **Developing, continuing, scaffolding, extending, steering, supporting, building on** the conversation, story, narrative
- **Helping/supporting children to** develop (etc) a story, story narrative, story language, storytelling
- Helping or supporting children to **tell or create their own story** *(double-code with **ITEM 28**)*
- **Using the child's interests, suggestions or ideas** to narrate or develop the story/storytelling using children's ideas *(double-code with **ITEM 28**)*
- **Retelling** a story or narrative
- **Questions, open questions, prompts or other verbal strategies** to encourage any of the above *(e.g. offering alternatives to develop the story, uses questions to develop the narrative, uses questions to find out what happens next in the story; Asking for clarification about parts of the story when retelling it)*[1]
- **Linking** ideas, phrases, sentences together

Note: Supporting children to retell/recall a story could be considered as higher order thinking. But was too hard to disentangle and credit the element of recall/repetition in relation to the story.

CODE ELSEWHERE

Extending/expanding:

- references to extending/expanding the child's **language, vocabulary, grammar, phrases or sentences** should be coded to **ITEM 4** (linguistic expansion)
- references to extending/expanding child's **thoughts or ideas** should be coded to **ITEM 18**, because the focus is on the developing the child's cognitive processes rather than building on their verbal contributions

Examples can be used to refine the coding. For example, *"expanding on child's answer - a breakfast -> a shopping list for breakfast"* can be coded to 4 rather than 15 because it clearly relates to linguistic expansion.

Code as NON-SPECIFIC (if no other detail given):

- Storytelling *(cannot tell what is meant)*
- Extending, expanding, expansion
- Scaffolding/scaffolding language
- Questions/prompts/offering alternatives

- **(Using) story language or vocabulary** – **ITEM 3**
- **Modelling fictional narrative** - **ITEM 20**
- Simple references to **'story' or 'stories'** – **ITEM 29**

DOUBLE-CODING

- *"using the child's interests, suggestions to develop the story"* - **ITEM 15+28**
- *"supporting children to tell their own story"* - **ITEM 15+28**
- "supporting children to incorporate and extend the narrative in play" – **ITEM 15+30**

16: Supporting mutual understanding and adapting language to the child's level e.g. using accessible speech, checking child's comprehension and adjusting own language accordingly; adapting questions to support the child in answering.		
CODE TO ITEM • Using slow/clear speech or short phrases/sentences *(e.g. to support understanding)* • Checking **child's comprehension** or understanding of what the **adult** has said *(e.g. through questioning)* • Adult checking their **own** understanding of the **what the child has said/**clarifying the child's meaning [1] • Showing understanding of child's language level or adjusting language to child's level (e.g. *to help child understand,)* • Rephrasing to help the child understand/ rephrasing questions to support the child in answering **The following can be coded here <u>if the response explicitly</u> references their role in, for example, clarifying the child's meaning or understanding:** • Repeating the child's words *(e.g. to establish understanding)* • Questions/prompts *(e.g. to establish understanding)* ***Examples: 'clarifying by repeating back the child's words'; 'repeats to check understanding; 'establishes understanding through questioning'.***	**CODE ELSEWHERE** **Do not credit if no further detail provided:** • Understanding • Clarifying • Confirming References to signing or Makaton should be coded to **ITEM 8.**	**EXAMPLES OF DOUBLE CODING** • *"extending vocabulary – but understanding language level"* **– ITEM 16+1** • *"<u>rephrasing</u> to make the meaning clearer (further->longer)"* **– ITEM 16+7** • *"clear, calm speech"* – **ITEM 16+22**

17. Supporting children to attend and participate		
CODE TO ITEM • References to engaging the children/supporting their attention or focus (including use of voice tone or facial expression to do so)	**CODE ELSEWHERE**	**EXAMPLES OF DOUBLE CODING**

PROMOTING HIGHER ORDER LANGUAGE AND THINKING

There is inevitable overlap between items 18-21. If you cannot decide, use best-fit to assign one category. For example, you might code "encouraging children to explain their thinking" under 18 (thinking) rather than 19 (prediction, explanation etc). In general, responses coded under Items 18-21 will not also be coded elsewhere. For example, "modelling language by thinking out loud" would be coded only to Item 18 and not also to Item 3. For exceptions, see below.

18: Promoting children's thinking

Responses which explicitly reference adults modelling thinking, engaging in shared thinking with children, developing children's thinking or ideas, or encouraging children to express their thinking

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
Responses which explicitly reference modelling thinking or promoting children's thinking/ideas: • Modelling thinking/thought processes/thinking out loud/ talking about thinking or opinions • Extending, expanding, developing, challenging, encouraging, clarifying children's thinking/ideas • Encouraging children to think (critically/encouraging deeper or further thinking) • Encouraging children to express, articulate, describe or explain their thinking • (Engaging in)/encouraging) sustained shared thinking [1] • Helping/supporting children with their thinking or thought processes/to order their thoughts • Scaffolding thinking • Questioning, open questions, prompting etc to encourage or extend any of the above *(e.g. 'questions the child to make him think').* Purpose must be explicit (e.g. 'how do you think that happened' is not enough). • Encouraging/inviting questions from the children The reference to thought must be explicit, e.g. *''I'm drawing my box of cereal and my bowl that I'm going to eat it out of, and then I think I'm going to…'''* should not be credited as modelling thinking. [1] **Sustained shared thinking** occurs when two or more individuals 'work together' in an intellectual way to solve a problem, clarify a concept, evaluate an activity, extend a narrative etc.	• **Recasting thinking** (e.g. recasts thinking back in sentences) should be coded to **ITEM 4** because the emphasis is on linguistic rather than cognitive development • **Expanding on** or **building on** the child's thoughts/ thinking/ ideas should be coded under **ITEM 15** because the emphasis is on developing children's ideas to further the conversation, rather than on the development of cognitive processes. • Responses such as *"uses time words to sequence thinking"* should only be coded to **ITEM 2** because the focus is on grammatical structure **Do not credit if no further detail provided:** • Ideas/thinking/learning • Guiding, encouraging or extending learning • Suggesting/giving the children ideas	• *"modelling rich language and thinking"* **ITEM 18+3**

19. Prediction, speculation, reasoning, explanation and inference

e.g. talking with children about what will happen next in a story, discussing cause and effect, making predictions, explaining why things happen.

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
References to: • Predicting, speculating, inferring, reasoning, problem-solving/ posing a problem, explaining* • Modelling, engaging in, encouraging or developing prediction etc	**Do not credit if no further detail provided:**	

• Everyday descriptions of any of the above (e.g. explaining - talking about why or how things happen, talking about cause and effect; predicting or speculating - talking about the future/what might happen, talking about how a character might feel. • Questioning, open questions, prompting etc to encourage/prompt prediction etc. *(NB: purpose must be explicit, simply quoting an open question e.g. 'how do you think that happened' is not enough)* ***Examples might include: 'predicting', 'speculating ('what will happen next?)', 'developing problem-solving', 'encouraging the child to explain what is happening', 'provided narrative to explain what the child was doing'*** * In order to promote higher-order thinking, explanations should relate to cause-and-effect or abstract concepts. Responses which reference such explanations should be coded here (e.g. "*Explaining - oh I see, so you pulled it up to make a steeper slope")* Sometimes explanation will be used to mean 'describing' concrete events or actions (e.g. '*explains so that the other children understand Niaz*'). Such responses should be coded to **ITEM 6**. Use the vignette context to decide how/where to code.	• Challenge/ challenging	

20: Modelling fictional narrative

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
Responses to Vignette 3 which reference narrative should be coded here, unless it is clear that they refer to concrete narrative of events. Examples might include: • (Story) narrative • Providing narrative/narrates the story • Models storytelling • Recalls from the story, using story language	References to narration of concrete events in the here-and-now should be coded to **ITEM 6.**	• "links story to play, provides narrative" **– ITEM 20+30** • "revisited story, using narrative, in different situations to develop understanding" - **ITEM 20+30**

21. Use of open questions

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
References to open questions which do not provide enough additional detail to code elsewhere. These will generally be: • Simple references e.g. 'open questions' or 'uses open questions' • A reference to questioning + an example of an open question (e.g. *"questioning - what will happen next?").* Only code to Item 21 if the examples provided are *all* open questions.		

POSITIVE RELATIONSHIPS AND CHILD WELLBEING

Responsive behaviours which create positive adult-child relationships, and which promote children's wellbeing and sense of self

22: Positive affect or communication e.g. warmth, smiling, using a warm or calm voice, being playful and having fun with children

CODE TO ITEM

- Warmth, smiling, enthusiasm, being welcoming
- (Using) warm or calm voice *(speech, language, communication, manner etc)*
- Being playful, having fun OR using humour
- Positive or enthusiastic responding *(see right)*
- Using positive language

CODE ELSEWHERE

This category is about positive affect, whereas Item 23 addresses individual attention and response. For example, *"responding positively and enthusiastically to children"* would be coded here but *"listening attentively"* or *"responding sensitively"* would be coded under **ITEM 23.**

EXAMPLES OF DOUBLE-CODING:

- Responses which refer to positive or enthusiastic response (e.g. responding positively or enthusiastically to the child) should be double-coded with **ITEM 13**
- ***"eye contact** and smiling"* – **ITEM 22+10**
- *"enthusiastically repeating his ideas back to him"* – **ITEM 22+14**
- "*clear, calm speech*" – **ITEM 22+16**
- *"being playful and following the child's lead"* – **ITEM 22+28**
- *"showing enthusiasm and interest"* **– ITEM 24 only**

23: Individual attention and sensitive responding

CODE TO ITEM

- Providing or giving individual attention/ focusing on one child
- Uses child's name
- Observing, tuning in or watching *(e.g. to the child/child's play)*
- Interpreting child's needs/actions/ wants]
- Attentive, careful or sensitive responding/listening/feedback on language *(see double-coding)*

CODE ELSEWHERE

Showing interest or curiosity in the child or what they say should be coded under **ITEM 24**. Showing interest in the child's interests, activities, work or play - code as **ITEM 28**

CODE AS NON-SPECIFIC (if no other information given):

- Interest/showing interest/being interested

EXAMPLES OF DOUBLE-CODING:

- *"attentive, careful or sensitive feedback on language"* – **ITEM 23+4**
- *"attentive, careful or sensitive responding/ listening"* – **ITEM 23+13**
- "*Observing, Waiting and Listening (OWL)"* – **ITEM 23+13**
- "*watching and waiting*" – **ITEM 23+13**

24. Promoting children's self-worth

CODE TO ITEM

References to:

- Praising the child *(focus of praise may not be mentioned, does not need to be language-specific)*
- Encouraging children
- Positive reinforcement
- Valuing children's ideas, efforts, responses, contributions, what the child says etc
- Showing interest or curiosity in the child or what the child says/their contributions/responses/ideas *(vs showing interest in the child's interests, activities, work, play which should be coded under **ITEM 28**)*

CODE ELSEWHERE

Showing interest in the child's interests, activities, work or play should be coded as **ITEM 28**

Code as NON-SPECIFIC (if no other detail given):

EXAMPLES OF DOUBLE CODING

- *"commentary which positively impacts confidence based on abilities"* – **ITEM 24 + 6**
- *"showing interest in child/open for business"* – **ITEM 24 + 10**
- *"encouraging/ interested in the child's play"* – **ITEM 24 + 28**

• Other strategies referenced with the stated intention of promoting children's self-worth or confidence *(e.g. "commentary which positively impacts confidence based on abilities")* • Other credible references to making children feel valued and competent (e.g. *"making the child the expert", "children have ownership", "each child feels they are valued")*	Interest, showing interest, being interested (not clear whether this is in the child themselves, or in their activities etc)	• *"positive praise to boost social profile- thanked him for giving out paper"* – **ITEM 24 + 27** • *"used encouragement, challenged the child"* – **ITEM 24 + 29**

25. Using a non-directive approach

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
References to: • Encouraging or allowing experimentation/the child to try things out • Encouraging the child to take risks • Encouraging independence • Allowing the child to try their own ideas/does not restrict child's exploration	*Encouraging* (rather than allowing) the child to try their own ideas would be coded under **ITEM 18** (promoting children's thinking). This is a fine line! The focus in this item is on being non-directive, whereas Item 18 addresses the active promotion of children's thought.	• *"allows the little girl to try out ideas and use her own language"* – **ITEM 25+13** (in relation to allowing the child to use her own words)

26: Facilitating peer communication
e.g. narrating one child's actions to another, modelling responses between children, suggesting a child asks another child a question, encouraging children to listen to each other.

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
The response must explicitly mention peer communication/language in order to be coded here. The only responses to be solely coded to this item will be, for example: • Supporting peer communication [talk, conversation etc] • Supporting children to listen to each other The remainder will likely be double-coded *(see right)*	Responses which refer to other children but which are not explicit about support for peer communication should not be coded to Item 26. For example: • *"models conventional language – saying thank you for Stephen"* – **ITEM 3 only** • *"describing the child's behaviour 'he's giving you a piece of paper"* – **ITEM 6 only** Responses referencing support for peer interaction or relationships should be coded under **ITEM 27.**	• *"supporting peer communication by narrating"* – **ITEM 26+6** • *"explaining one child's actions to another so they understand each other"* – **ITEM 26+6** • *"suggesting a child asks another child a question"* – **ITEM 26+11**

27. Facilitating peer interactions and relationships

CODE TO ITEM	CODE ELSEWHERE	EXAMPLES OF DOUBLE CODING
• Supporting/encouraging/scaffolding peer interactions [relationships] • Engaging/involving other children *(e.g. in play)* • Encouraging/supporting collaborative learning • Supporting social development • Social coaching	Responses which refer to other children but which are not explicit about support for peer interactions should not be coded to Item 27. For example: • *"models use of conventional language – saying thank you for Stephen"* – **ITEM 3 only** • *"describing the child's behaviour 'he's giving you a piece of paper"* – **ITEM 6 only** Responses referencing support for communication should be coded under **ITEM 26.**	• *"commenting on children's actions to other children promoting social interaction"* – **ITEM 27+6** • *"positive praise to boost social profile"* – **ITEM 27 + 24**

MEANINGFUL AND ENGAGING CONTEXTS FOR LANGUAGE-LEARNING

Promoting language within contexts likely to be meaningful or interesting to the child

28. Joint attention: following children's lead and interests to motivate them to communicate and enhance language-learning through joint attention

CODE TO ITEM

References to using child-led learning and following the child's lead:

- Engaging with, building on, following or using the child's interest or lead
- Letting the child/ren lead *(e.g. the play, the story)*
- Child-led or -initiated experiences/activities
- Showing interest/curiosity/engagement in the child's interests, activities, work, play

Engaging in talk related to children's interests:

- Engaging in talk/introducing language or vocabulary related to children's interests
- Using/building on the child's interests to develop language, communication, vocabulary etc
- Using the child's interests/ideas to narrate or develop the story (double-code with **ITEM 15**)
- *(Supporting children to)* tell their own story (double-code with **ITEM 15)**

Joining the child in their play:

- Joining/getting involves in the child's play, being a 'play partner', playing alongside the child
- Mirroring or reflecting what the child is doing

CODE ELSEWHERE

References to **allowing or encouraging experimentation** should be coded to **ITEM 25** (non-directive approach)

References to allowing the child to lead **the conversation** (i.e. rather than play etc) should be coded to **ITEM 13**

References to **responding** to the child's lead/allowing time for the child to lead should be coded to **ITEM 13**

Showing interest **in the child** should be coded to **ITEM 24**

Do not credit if no further detail provided:

- Being engaged/engagement

Code as NON-SPECIFIC (if no other detail given):

- Interest/showing interest/being interested

EXAMPLES OF DOUBLE CODING

- *"joining their play at their physical level"* – **ITEM 28+13**
- *"supporting children to tell their own story"* - **ITEM 28+15**
- "*using the child's interests/ideas to narrate the story*" - **ITEM 28+15**

29: Providing meaningful and engaging contexts and activities for language

CODE TO ITEM

General references to meaningful contexts

- *(Use of, provision of, creating)* engaging, meaningful, irresistible, exciting or stimulating environment [contexts, resources, activities, experiences]
  (e.g. for language, communication, discussion, learning – or may not reference any of these)
- *(Providing, using, creating)* an environment etc to promote or encourage language, communication etc

References to specific contexts or activities likely to be engaging or meaningful (whether or not the response references its purpose in engaging children, or in developing language or communication):

- *(Using)* play, block play, narrative play, investigating, story/stories *(but not storytelling or problem-solving, see right)*
- Pretending, imagining, role play
- References to making a shopping list (Vignette 2), modelling the writing of a list, guiding the child to make a list etc
- Setting/providing challenges, challenging the child, challenging learning *(but not challenging thinking – see right)*
- *(Use of)* real-life, practical or concrete experiences or activities
- Providing resources which relate to new language/the story
- (Encouraging children to use) props, picture prompts, drawings, concrete objects, represent ideas through drawings etc
  (NB: if explicit reference to vocabulary code to **ITEM 8***)*

References to specific contexts or activities likely to be engaging or meaningful (only credit if an explicit reference is made to their potential role, otherwise do not code):

- Music (e.g. *"use of music to set the scene")*
- Storytelling
- Specific contexts from the videos e.g. dragons, the princess, breakfast (e.g. *"breakfast prompts")*

CODE ELSEWHERE

Allowing or encouraging experimentation - **ITEM 25** (non-directive approach)

Problem-solving, predicting, speculating - **ITEM 19.**

Challenging, expanding etc thinking or ideas - ITEM 18

Do not credit if no further detail provided:

- Books or reading
- Storytelling
- Ideas
- Guiding, encouraging, directing, extending learning, play or the activity
- Suggesting or giving ideas *(e.g. to develop the play)*

EXAMPLES OF DOUBLE CODING

- *"new words in context"* - **ITEM 29 + 1**
- *"new language through play"* **ITEM 29 + 3**
- *"repeating key vocabulary in context"* - **ITEM 29 + 5**
- *"explaining meaning in context"* **ITEM 29 + 7**
- *"used encouragement, challenged the child"* – **ITEM 24 + 29**

References to **modelling language in context** (e.g. *'thinking out loud about her own breakfast' or 'thinking out loud about what is happening')* can also be coded to **ITEM 29**

30: Deepening learning

e.g. links to prior learning; links between activities or curriculum areas; revisiting language, activities or experiences; follow-up opportunities for children to use new language in different contexts.

CODE TO ITEM

- Links/connections to *(child's)* prior learning [activities, discussions, play, story, experiences]
- Links [etc] to/between other areas [activities, areas of the curriculum]
- Deepening *(language/topic)* knowledge
- Revisiting, continuing or repeating activities [themes, experiences, actions, language] *(in other areas/contexts, at different times)*
- Providing *(follow-up)* opportunities for children to use new language in different contexts

CODE ELSEWHERE

- Retelling the story (Vignette 3) **– ITEM 15**
- Summarising/ recapping *(e.g. on events, what has happened, what the child has done)* **– ITEM 6**

Deciding between 29 and 30: responses which imply use of language across contexts would generally be coded under 30 rather than 29, e.g. '*taking the story into role* play".

EXAMPLES OF DOUBLE CODING

- "supporting the children to incorporate & extend the narrative in play" **– ITEM 30+15**

SECTION 2: THE USE OF EXPERT TERMS SCORE

Strategy code	Examples of informal descriptions	Expert term/s credited
ADULTS MODELLING LANGUAGE FOR CHILDREN		
4. Linguistic expansion or recasting of children's language	• repeating back what the child says using the correct language • extending child's language and adding detail	• recasting *(child's language etc)*
6. Using descriptive, informative & narrative language in concrete contexts	• talking about what the child is doing • commenting • explaining • describing	• descriptive commentary • running commentary/ narrative • self-talk • commentary/ commentating
PROVIDING EXPLICIT INFORMATION ABOUT WORD MEANINGS		
8. Providing explicit definitions of words	• explaining the meaning of words	• providing definitions of words
FACILITATING COMMUNICATION AND CONVERSATION		
11. Inviting communication: *verbal strategies*	• why/how questions • yes/no questions	• open questions • closed questions
12. Inviting communication: *vocabulary*	• leaving a gap for the child to fill in the blanks • incomplete phrases to complete with the missing word	• completion prompts
PROMOTING HIGHER ORDER LANGUAGE AND THINKING		
18. Promoting children's thinking	• talking about thinking • modelling thinking/thought processes	• meta-cognition • pole bridging
18. Promoting children's thinking	• supporting children's thinking • helping child think through a problem	• sustained shared thinking
GENERAL TERMS USED WITHIN MULTIPLE CATEGORIES		
Scaffolding language	• continuing, supporting or extending language, conversation or narrative	• scaffolding *(language, conversation etc)*

ADULTS MODELLING LANGUAGE FOR CHILDREN	
Examples of valid techniques	**Valid pedagogical intentions**
ITEMS 1, 2, 3 and 6 • Using the words e.g. steeper and faster • Modelling, providing, introducing (etc) using language • Modelling, providing, introducing, using vocabulary [grammar, sentences, pronouns, adjectives, comparative language, prepositions, time words, time connectives etc] • Providing/using a commentary or story language, narrating, talking through actions or events • Recapping what has happened • Modelling responses, questions or suggestions	• To encourage correct use of vocabulary • For children to repeat • To support child's grammatical development • To support, develop or extend vocabulary/grammatical/narrative skills or development • To develop, structure or extend a narrative or story/sequence thinking/give chronology *(esp. in relation to commentary, prepositions)* • To reinforce language • For the child to hear/to provide the child with the words she needs • To show emotion *(pragmatics – showing and using expressive vocabulary to show emotion)* • To support learning/understanding/comprehension • To extend/expand *(NB: do not credit this intention for Item 4)* **Do not credit, for example:** • To support the story • To model to the children how to write a list
ITEM 4 • Remodelling/rephrasing/recasting *(the child's words)* • Repeating child's language back correctly • (Repeating and) adding detail, vocabulary, tenses, pronouns etc • Extends child's sentences, phrases	• To extend, expand or develop vocabulary, grammar or language *(NB: not an appropriate purpose for 'extend child's sentences, phrases etc')* • To support language, vocabulary, grammatical development • To provide feedback on language • To ensure the child heard the correct language/model (correct) language, words or grammar **Do not credit, for example:** • Correcting/to correct vocabulary, words or grammar

	• To expand/extend (with no further detail)
ITEM 5 • Repeating or emphasising words • Repeats narrative • Using expression or voice tone	• To model language, words or grammar • To reinforce language/meaning • To encourage child to use them • To support learning/understanding/meaning (of words etc) • For children to hear/ 'bump into' • To support grammatical development (with ref to narrative only)
PROVIDING INFORMATION ABOUT WORD MEANINGS	
Examples of valid strategies/behaviours	**Examples of valid purposes**
ITEM 7 • Repeating meanings • Using familiar words	• To reinforce (meaning of (new) words)
ITEM 8 • (Uses) gesture, actions, • Shows object/makes link to object	• To support/model/define/explain (new) vocabulary, words or concepts • To provide/model/support/clarify/explain/show/reinforce meaning or to make meaning clear • To provide a meaningful context (for words/language/learning) • To support or aid understanding, to help children understand new words • To give visual clues (to meaning) • To reinforce language • To model, support or represent words/vocabulary or some other specific term (e.g. positional language) **Do not credit, for example:** • To represent talk • To support language • To reinforce the story

FACILITATING COMMUNICATION	
Examples of valid strategies/behaviours	**Examples of valid purposes**
ITEM 10 • Sitting at child's level • Making eye contact • Body language, gestures, eye contact, expressions etc	• To encourage, invite, prompt interaction/response • To promote, prompt, develop, invite or 'be a magnet for' communication/interaction/response • To initiate, create or spark conversation **Do not credit, for example:** • So child can see face
ITEM 11 • (Open) questions/questioning • Prompts • Commenting/making comments • Providing information/ informing • Offering alternatives/giving examples	• To encourage, promote, prompt, develop invite or 'be a magnet for' communication/ interaction/response • To initiate, create, create a culture of, begin, spark conversation/engage children in communication • To encourage the child to describe, clarify, articulate, provide further information/to prompt information • To scaffold or model conversation (skills), as a conversation strategy • To extend/develop child's talk, language, narrative skills • To provide opportunity for child to show understanding **Do not credit, for example:** • To communicate • To extend (the child) • To extend the activity/play • To promote language • Leaving gaps/ a pause for the child to fill in the words/complete with the missing word, for a missing word. The only one I did count was 'leaving pause for child to begin to use new vocabulary'
ITEM 12 • (Open) questions • Prompts	• To extend vocabulary • To provide an opportunity for the child to apply/use words, new vocabulary etc • For specific nouns and uses

ITEM 13 • Listening or paying attention (to the child) • Responding or reciprocating	• To scaffold conversation/ as a conversation strategy • To encourage, invite, prompt interaction/response • To promote, prompt, develop, invite or 'be a magnet for' communication • To initiate, create or spark conversation **Do not credit, for example:** • Pausing for response/ giving the child time to think. Would only count if it said eg 'pausing for response to encourage the child's communication'
• Body language/gestures • Repeating/imitating child's words	• To show she is listening • To affirm child's communication • To scaffold conversation/ as a conversation strategy
ITEM 14 • Repeat/imitate (children's words)	• To reinforce • To let the child know they have been understood • For confirmation/to affirm • To develop grammar (not great evidence on this but technically it could, by providing positive feedback) **Do not credit, for example:** • To model language
ITEM 15 • Questions • Expanding/building on the child's responses, answers or ideas • Offering alternatives	• To add order to narrative • To develop or continue the conversation, discussion, narrative, story, retelling of the story • To support, develop, extend or continue (retelling of) the narrative or story • To 'find out what happens next' in the story
ITEM 16 • Repeating own words • Imitating or confirming the child's words, language, sentences etc/ repeating back • Asking questions	• To clarify • To clarify child's answers/what the child is saying/what the child means • To check, establish or elicit understanding/meaning (of what the child has said) • To check child's understanding • To support comprehension (not sure this means language comprehension but code here)
• Re-phrasing/asking question in a different way	• To make meaning clearer/to support the child in understanding • To support the child in being able to respond or answer

ITEM 17 • Using different voices/changing tone of voice • Using children's names • Asking questions • Joining in play	• To engage children/maintain children's attention/keep children on-task
PROMOTING HIGHER ORDER LANGUAGE AND THINKING	
Examples of valid strategies/behaviours	**Examples of valid purposes**
ITEM 18 • Talking things through with the child • Questions/open questions	• To help the child with her thought processes • To encourage, develop, deepen, broaden, extend, support, clarify or challenge thinking, thought processes or ideas • To make children think/for further thinking • To support or develop understanding/further learning (not strictly thinking but have included)
ITEM 19 • Questions/open questions • Prompts/prompting	• To prompt/encourage the child to explain, extend children's explanations
ITEM 21 • Open questions	• To encourage, promote, prompt, develop invite or 'be a magnet for' communication/ interaction/response • To initiate, create, create a culture of, begin, spark conversation/engage children in communication • To encourage the child to describe, clarify, articulate, provide further information/to prompt information • To scaffold or model conversation (skills), as a conversation strategy • To extend/develop child's talk, language, narrative skills • To provide opportunity for child to show understanding **Do not credit, for example:** • To communicate • To extend (the child) (the activity/play) • To promote language **CODE ELSEWHERE:** to promote thinking, learning, understanding (Item 18); to encourage the child to explain (Item 19)

POSITIVE RELATIONSHIPS AND CHILD WELLBEING	
Examples of valid strategies/behaviours	**Examples of valid purposes**
ITEM 24 • Encouraging and supporting children • Praise • Descriptive commentary (would also be coded 6)	• To encourage, promote, prompt, develop invite or 'be a magnet for' communication/ interaction/response • To boost social profile • To boost children's confidence
ITEM 26 • Narrating (e.g. one child's actions to another) • Explaining • Appropriate example if linked to clear purpose e.g. The teacher supports the children to communicate and listen to each other. E.g. 'Oh look, Niaz is giving you a piece of paper, Stephen, to write a shopping list. Thank you Niaz.	• To support children to communicate with each other • To support children in understanding each other/understanding Niaz
ITEM 27 • Commenting on children's actions to other children • Role modelling • Appropriate example if linked to clear purpose e.g. Supports peer interaction - look Niaz is going to rescue her (referring to princess mentioned by other child)	• Promoting social interaction/peer interaction • Encouraging other children to get involved
MEANINGFUL AND ENGAGING CONTEXTS FOR LANGUAGE-LEARNING	
Examples of valid strategies/behaviours	**Examples of valid purposes**
ITEM 28 • Using child-led experiences • Children telling their own story	• To provide/create a meaningful context for language/communication • To motivate the child to communicate/make them enthusiastic about communicating • To introduce, model or develop (new) language, to provide words in context • To provide an engaging or irresistible context/engage the child/provide a 'hook'

• Building on or using children's interests/things children are engaged in	• To encourage, promote, prompt, develop, invite or 'be a magnet for' communication/interaction/ response • To initiate, create or spark conversation/ create a culture of conversation • To develop or build on children's language, vocabulary, grammar or narrative skills
• Joining children's play	• To provide opportunities to apply and reinforce
ITEM 29 • (Using) play/block play/role play • Storytelling • Creating an environment/ activity • Pretending/pretend • Linking language to practical or concrete experiences • Appropriate example if linked to clear purpose e.g. Created meaningful contexts for learning - do you want to write something? what do you want to write? i'm going to draw some cereal, what goes on cereal?	• To provide/create a meaningful context for language or communication/so that it is meaningful/to help child learn the meaning of words • To provide an engaging or irresistible context/engage the child • To spark children's imagination • To motivate the child to communicate/make them enthusiastic about communicating • To encourage, promote, prompt, develop, invite or 'be a magnet for' communication/interaction/ response • To initiate, create or spark conversation/ create a culture of conversation/as a conversation strategy • To introduce, model or develop (new) language, to provide words in context • To develop children's language, vocabulary, grammar or narrative skills **Do not credit, for example:** • To communicate/interact • To extend the activity/play
ITEM 30 • Linking to or drawing on previous learning/discussions • Revisiting story, topics or themes • Linking experiences inside and outside classroom • 'Sticking around' in conversations	• To provide a meaningful/engaging context (e.g. for language) • To reinforce language or learning • To deepen topics/learning, to develop understanding • To support independent play/narratives • To model/create opportunities for children to 'bump into' language • To enable children to use ideas or words they have already learned • To give first-hand/meaningful/concrete experiences to children **Do not credit, for example:** • To extend (the child)

GENERAL GUIDANCE ON RESPONSES WHICH WOULD NOT BE CREDITED AS IDENTIFYING A PEDAGOGICAL INTENTION	
Provides a strategy and an example rather than a strategy and an intention	• Modelled the vocabulary using the words eg. slow and fast • Explaining (That's right, a steeper slope made it go faster) • Expands vocabulary: strong hands? Paws? • Hand gestures - when explaining to the children they pushed the door open, the practitioner used her hands to show this
Provides elaboration or reports of multiple strategies, rather than a pedagogical intention	• Explaining what is happening using appropriate vocabulary i.e. steeper • Provides new language/vocabulary through play • Narrative at child level using gestures and props
Offers two different ways of describing the same strategy, rather than a strategy and an intention	• Commenting - narrating what the child is doing • Expanding, by repeating and adding vocabulary • Modelling back correctly e.g. repeating correctly if the child misses a word out
Stated intention is not credibly language-supporting, or is vague OR response not awarded a Strategy Code	• … to help • …. to support • …to interact • …to communicate • …for the child • …to support, develop, extend or expand • …to support, develop, extend or expand play/the activity
Intention does not match stated strategy	• Supports grammatical development by modelling the correct word eg., pencil.

RESPONSES CAN ALSO BE CREDITED AS PROVIDING AN INTEPRETATION IF THEY…	
…identify a credible effect on children	**Examples:** • She asks an open question, which encourages the child to respond and broaden his thoughts about breakfast • She is using key vocabulary such as slower, faster, steep, further. She continually repeats this vocabulary the child soaks up the language and begins to use it herself • The teacher models how to use narrative skills to describe what the child is doing. This is then copied by the child and she is able to narrate what she is doing and the effect it was having on the speed of the car. • She was a magnet for communication to the child, he kept looking for her to speak to • Remodelling sentences - child repeats new words • The child was eager to talk about what happened to the princess - irresistible contexts
…or reference pedagogical decision-making	**Examples:** • She used an open rather than a closed question, to promote the child to give a longer answer • Repeating language correctly rather than correcting the student • Using correct mathematical vocabulary, cuboid not brick • The teacher created repeated opportunities for the child to bump into new language. E.g. the teacher asks 'Is it heavier than this cuboid, this long cuboid?' The teacher could have just used the word block or ramp. But she decided to reinforce the mathematical language of cuboid.

APPENDIX 7: OLP Score Distributions (Vignettes 2 and 3)

Table A.7.1 Histograms and QQ plots for Vignette 2

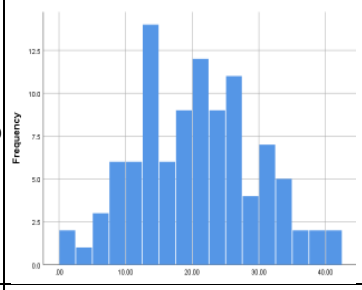
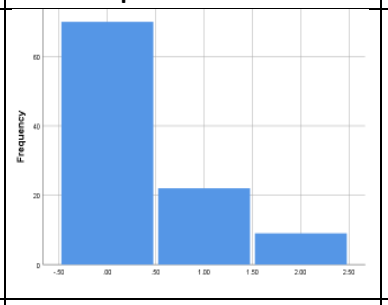
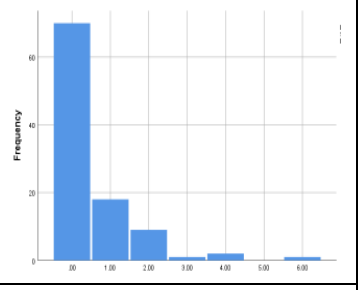
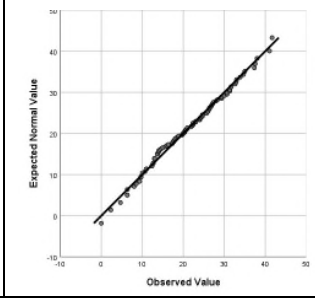
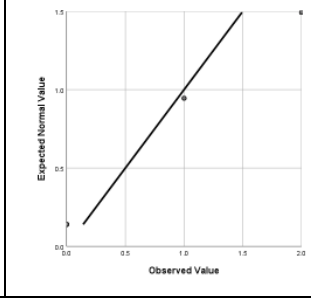
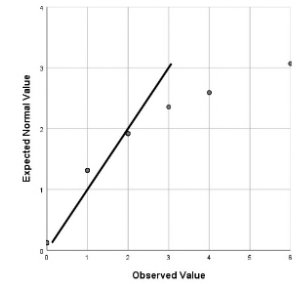
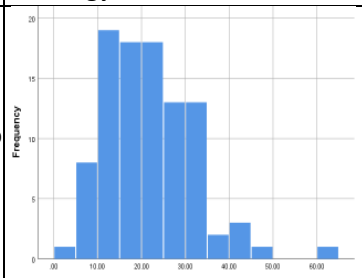
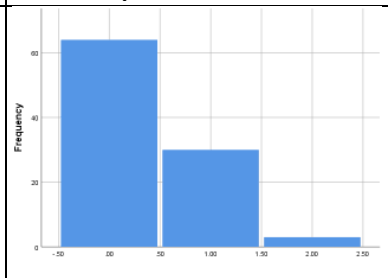
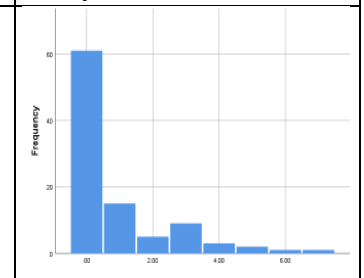
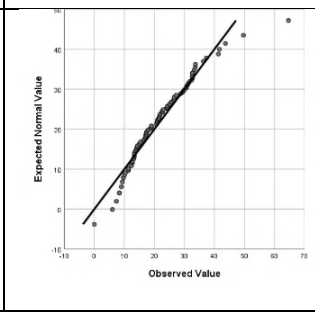
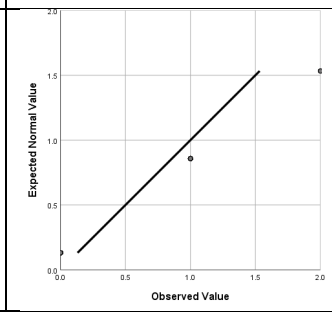
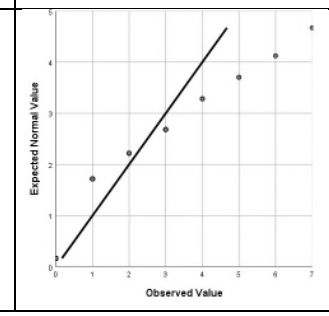
	Strategy Score	Use of Expert Terms	Analysis Score
Histogram			
QQ Plot			

Table A.7.2 Histograms and QQ plots for Vignette 3

	Strategy Score	Use of Expert Terms	Analysis Score
Histogram			
QQ Plot			

APPENDIX 8. Supplementary information relating to factor analysis of ERS data

Overview of items in the Environment Rating Scales

ECERS-3 (Harms, Clifford & Cryer, 2014)

Space and furnishings

1. Indoor space
2. Furnishings for care, play and learning
3. Room arrangement for play and learning
4. Space for privacy
5. Child-related display
6. Space for gross motor play
7. Gross motor equipment

Personal Care Routines

8. Meals/snacks
9. Toileting/diapering
10. Health practices
11. Safety practices

Language and literacy

12. Helping children expand vocabulary
13. Encouraging children to use language
14. Staff use of books with children
15. Encouraging children's use of books
16. Becoming familiar with print

Learning activities

17. Fine motor
18. Art
19. Music and movement
20. Blocks
21. Dramatic play
22. Nature/science
23. Maths materials and activities
24. Maths in daily events
25. Understanding written numbers
26. Promoting acceptance of diversity
27. Appropriate use of technology

Interaction

28. Supervision of gross motor
29 Individualised teaching and learning
30 Staff-child interaction
31 Peer interaction
32 Discipline

Program Structure

33. Transition and waiting times
34. Free play
35. Whole-group activities for play and learning

ECERS-E Literacy subscale (Sylva, Siraj & Taggart, 2003)

Literacy subscale

1. Environmental print
2. Book and literacy areas
3. Adult reading with children
4. Sounds in words
5. Emergent writing/ mark making
6. Talking and listening

SSTEW (Siraj, Kingston & Melhuish, 2014)

Building trust, confidence and independence

1 Self-regulation and social development
2 Encouraging choices and independent play
3 Planning for small group and individual interactions/adult deployment

Social and emotional wellbeing

4. Supporting socio-emotional wellbeing

Supporting and extending language and communication subscale

5 Encouraging children to talk with others
6 Staff actively listen to children and encourage children to listen
7 Staff support children's language use
8 Sensitive responsiveness

Supporting learning and critical thinking subscale

9 Supporting curiosity and problem solving
10 Encouraging SST through storytelling, sharing books, singing and rhymes
11 Encouraging SST in investigation and exploration
12 Supporting children's concept development and higher-order thinking

Assessing learning and language

13 Using assessment to support and extend learning and critical thinking
14 Assessing language development

Selection of Environment Rating Scales (ERS) items which most clearly reflect language-supporting practice

Ten ERS items were selected as most clearly reflecting language-supporting practice (Table A.8.1). This was achieved by mapping the strategies identified within the literature review with all items included within the ERS, and assessing which ERS items provided the closest match. Of the items identified, ten were selected as reflecting the greatest number of language-supporting strategies between them, with the aim of including at least one item under each main OLP heading. The ten items selected are highlighted in green and were:

1. ECERS-3 Item 12 Helping children expand vocabulary
2. ECERS-3 Item 30 Staff-child interactions
3. SSTEW Item 2 Encouraging choices and independent play
4. SSTEW Item 5 Encouraging children to talk with others
5. SSTEW Item 6 Staff actively listen to children and encourage children to listen
6. SSTEW Item 7 Staff support children's language use
7. SSTEW Item 8 Sensitive responsiveness
8. SSTEW Item 10 Encouraging SST through storytelling, sharing books, singing, rhymes
9. SSTEW Item 12 Supporting concept development and higher-order thinking
10. ECERS-E Item 6 Talking and listening

Table A.8.1 Selecting the ten ERS items which most closely reflect language-supporting practice (selected items in green)

OLP Strategy	Environment Rating Scales items addressing these aspects of practice
ADULTS MODELLING LANGUAGE FOR CHILDREN	
a. Modelling diverse, rich or specific *vocabulary* likely to extend the child	• SSTEW Item 5 Encouraging children to talk with others • SSTEW Item 7 Staff support children's language use • ECERS-3 Item 12 Helping children expand vocabulary
2. Modelling diverse, rich or specific *grammar* likely to extend the child	
3. Simple language modelling (i.e. language which is appropriate and correct but which may not necessarily be diverse, rich or specific)	
4. Linguistic expansion or recasting of children's language	
5. Emphasising, repeating or reinforcing language modelled for children	
6. Using descriptive, informative & narrative language in concrete contexts	
PROVIDING EXPLICIT INFORMATION ABOUT WORD MEANINGS	
7. Providing explicit definitions of words	• ECERS-3 Item 12 (see above)
8. Providing concrete clues to meaning (e.g. gestures, pictures, props)	
FACILITATING COMMUNICATION AND CONVERSATION	
9. Engaging in conversation with children	• SSTEW Item 5 (see above) • SSTEW Item 6 Staff actively listen to children and encourage children to listen • SSTEW Item 7 (see above) • SSTEW Item 8 Sensitive responsiveness
10. Inviting communication: *non-verbal strategies*	
11. Inviting communication: *verbal strategies*	
12. Inviting communication: *vocabulary*	
13. Being a responsive conversation partner	
14. Affirming the child's language by repeating it	

15. Extending conversational or narrative content (semantic extension) 16. Supporting mutual understanding & adapting language to child's level 17. Supporting children to attend and participate	• SSTEW Item 10 Encouraging SST through storytelling, sharing books, singing and rhymes • ECERS-3 Item 13 Encouraging children to use language • ECERS-E Item 6 Talking & listening
PROMOTING HIGHER ORDER LANGUAGE AND THINKING	
18. Promoting children's thinking 19. Prediction, speculation, reasoning, explanation and inference 20. Modelling fictional narrative (prev. pretending, imagining, projecting) 21. Use of open questions	• SSTEW Item 5 (see above) • SSTEW Item 7 (see above) • SSTEW Item 8 (see above) • SSTEW Item 9 Supporting curiosity and problem-solving • SSTEW Item 10 (see above) • SSTEW Item 11 Encouraging sustained shared thinking in investigation and exploration • SSTEW Item 12 Supporting concept development and higher-order thinking • ECERS-3 Item 12 (see above) • ECERS-3 Item 13 • ECERS-E Item 6 (see above)
RELATIONSHIPS AND THE CHILD	
22. Positive affect or communication 23. Individual attention and sensitive responding 24. Promoting children's self-worth 25. Using a non-directive approach 26. Facilitating peer communication 27. Facilitating peer interactions and relationships	• ECERS-3 Item 30 Staff-child interactions • ECERS-3 Item 31 Peer interaction
MEANINGFUL AND ENGAGING CONTEXTS FOR LANGUAGE-LEARNING	
28. Joint attention: following children's lead and interests 29. Providing meaningful and engaging contexts and activities for language 30. Deepening learning	• SSTEW Item 2 Encouraging choices and independent play • SSTEW Item 5 (see above) • SSTEW Item 9 • SSTEW Item 10 (see above) • SSTEW Item 11 • SSTEW Item 12 (see above) • ECERS-3 Item 12 (see above)

Creating the ERS Maths factor

A Confirmatory Factor Analysis (CFA) was conducted on the three ECERS-3 items relating to support for mathematical development, to ensure that these formed a coherent construct. The items, and coefficients from the CFA are shown in Table A.8.2 below.

Table A.8.2 Coefficients for the three-item CFA model in study dataset (school-level sample, n=72)

Scale	Item	β	B	S.E.
ECERS-3	23. Maths materials and activities	.99	1.0	
ECERS-3	24. Maths in daily events	.53	.53	.33
SSTEW	25. Understanding written numbers	.31	..31	.21

Table A.8.3 Goodness-of-fit statistics

	Statistic	Criterion for judging fit Parry (n.d), Schreiber et al., (2006)
Chi squared (χ^2)*	χ^2 (0) = 0 p= 0.00	>.05 (Parry)
Root Mean Square Error of Approximation (RMSEA)	.00	<.06 - <.08 (Schreiber) <.08 (Parry)
Comparative Fit Index (CFI)	1.0	≥.90 (Parry), ≥.95 (Schreiber)
Tucker Lewis Index (TLI)	1.0	≥.95 (both sources)
Standardised Root Mean Square Residual (SRMR)	.00	<.08 (both sources)

* The statistic tests the null hypothesis that the CFA model being tested does not differ significantly from the saturated model. The saturated model reflects the best possible fit to the data, as it perfectly reproduces all variances, covariances and means. A non-significant result means that the tested model does not differ significant from the saturated model and the null hypothesis is not rejected: thus, the model fit is good. A χ^2 value of 0 means that the model fit it, essentially, perfect.

Comparing the quality profile with the full RCT study dataset

Table A8.4 Descriptive statistics for ERS variables in the school-level study sample (n=72) and the full RCT dataset (n=117)

	Full RCT sample			Study sample		
	Min (1-7)	Max (1-7)	Mean (1-7)	Min (1-7)	Max (1-7)	Mean (1-7)
ERS Oral Lang. Factor	.91	5.43	2.94	.91	5.10	2.91
SSTEW Overall Mean	1.21	5.64	2.86	1.21	5.43	2.84
ECERS-3 Overall Mean	1.54	4.91	2.96	1.54	4.54	2.94
ERS Maths Factor	.61	3.07	1.34	.61	2.56	1.29

APPENDIX 9. Supplementary information relating to associations with classroom quality

Table A9.1 Correlations between OLP Scores and Environment Rating Scales (ERS) variables for individual vignettes School-level sample

	ERS Oral Language Factor	ECERS-E Overall Mean	SSTEW Overall Mean
Strategy Scores - (Pearson's r correlations)			
Vignette 1 (n=72)	.23*	.22	.20
Vignette 2 (n=71)	.13	.05	.09
Vignette 3 (n=68)	.18	.22	.22
Use of Expert Term Scores (Spearman's rank order correlations)			
Vignette 1	.38**	.34**	.36**
Vignette 2	.37**	.30*	.38**
Vignette 3	.07	.18	.09
Analysis Scores (Spearman's rank order correlations)			
Vignette 1	.24*	.30*	.25*
Vignette 2	.26*	.25*	.29*
Vignette 3	.16	.17	.14

Table A9.2 Multiple linear regression analyses, with and without covariates
School-level sample, robust standard errors.

ERS Oral Language Factor (n=71)	B	S.E. (robust)	t	Sig	β
WITHOUT COVARIATES: R^2 = .23, Adjusted R_2 = .20, F (3,67) = 6.94, p=.000					
Noticing/Knowing How	-.02	.03	-.49	.623	-.08
Articulating How	1.39	.44	3.18	.002	.44
Reasoning About How/Why	.28	.15	1.86	.067	.23
WITH COVARIATES: R^2 = .33, Adjusted R_2 = .28, F (5,65) = 6.32, p=.0001					
Noticing/Knowing How	-.03	.03	-.93	.354	-.15
Articulating How	1.21	.41	2.98	.004	.38
Reasoning About How/Why	.29	.14	2.13	.037	.24
Years of teaching experience	.04	.02	2.11	.039	.23
Intervention group membership	.49	.21	2.33	.023	.23
NOTICING/KNOWING HOW + COVARIATES: R^2 = .19, Adjusted R_2 = .16, F (3,67) = 6.19, p=.0001					
Noticing/Knowing How	.03	.02	1.65	.103	.18
Years of teaching experience	.04	.02	2.26	.027	.25
Intervention group membership	.55	.24	2.32	.023	.27
SSTEW Overall Mean Score (n=71)	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
WITHOUT COVARIATES: R^2 = .26, Adjusted R_2 = .23, F (3,67) = 7.87, p=.000					
Noticing/Knowing How	-.03	.03	-1.02	.310	-.17
Articulating How	1.40	.38	3.70	.000	.46
Reasoning About How/Why	.37	.16	2.31	.024	.31
WITH COVARIATES: R^2 = .34, Adjusted R_2 = .29, F (5,65) = 6.67, p=.000					
Noticing/Knowing How	-.04	.03	-1.47	.168	-.22
Articulating How	1.27	.34	3.44	.000	.42
Reasoning About How/Why	.38	.15	2.52	.014	.32
Years of teaching experience	.04	.02	2.37	.025	.24
Intervention group membership	.33	.20	10.18	.095	.16
NOTICING/KNOWING HOW + COVARIATES: R^2 = .16, Adjusted R_2 = .12, F (3,67) = 5.39, p=.002					
Noticing/Knowing How	.03	.02	1.60	.115	.18
Years of teaching experience	.04	.02	2.44	.017	.27
Intervention group membership	.38	.22	1.70	.093	.19

ECERS-3 Overall Mean Score (n=71)	B	S.E. (robust)	t	Sig	β
WITHOUT COVARIATES: R^2 = .24, Adjusted R_2 = .20, F (3,67) = 6.91, p=.000					
Noticing/Knowing How	-.03	.03	-1.36	.288	-.20
Articulating How	.97	.29	3.60	.001	.44
Reasoning About How/Why	.29	.11	2.56	.018	.34
WITH COVARIATES: R^2 = .26, Adjusted R_2 = .21, F (5,65) = 4.65, p=.001					
Noticing/Knowing How	-.03	.02	-.32	.190	-.24
Articulating How	.90	.28	3.18	.002	.41
Reasoning About How/Why	.29	.12	2.52	.014	.35
Years of teaching experience	.01	.01	1.05	.297	.11
Intervention group membership	.21	.15	1.45	.152	.15
NOTICING/KNOWING HOW + COVARIATES: R^2 = .09, Adjusted R_2 = .05, F (3,67) = 2.00, p=.123					
Noticing/Knowing How	.02	.02	1.37	.174	.16
Years of teaching experience	.01	.01	1.15	.256	.12
Intervention group membership	.27	.17	1.57	.121	.19
ERS Maths Factor (n=71)	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
WITHOUT COVARIATES: R^2 = .14, Adjusted R_2 = .10, F (3,67) = 3.55, p=.019					
Noticing/Knowing How	-.00	.02	-.17	.868	-.04
Articulating How	.45	.26	1.76	.083	.30
Reasoning About How/Why	.13	.09	1.48	.144	.22
WITH COVARIATES: R^2 = .14, Adjusted R_2 = .07, F (5,65) = 2.11, p=.072					
Noticing/Knowing How	-.00	.02	-.16	.874	-.03
Articulating How	.46	.26	1.77	.082	.30
Reasoning About How/Why	.13	.09	1.48	.142	.22
Years of teaching experience	.00	.01	.42	.678	.05
Intervention group membership	-.02	.12	-.20	.843	-.02
NOTICING/KNOWING HOW + COVARIATES: R^2 = .06, Adjusted R_2 = .02, F (3.67) = 1.33, p=.270					
Noticing/Knowing How	.02	.01	1.93	.058	.23
Years of teaching experience	.00	.01	.47	.640	.05
Intervention group membership	.02	.13	.14	.887	.02

Table A.9.3 Standardised (β) and unstandardized (B) coefficients for ERS quality models in the intervention group School-level sample, original data (n=34, missing =1), robust standard errors.
R^2 and adjusted R2 values generated using non-SEM multiple linear regression models

	B	Robust S.E.	β	Robust S.E.
ERS Oral Language Factor				
Noticing/Knowing How	-.01	.04	-.07	.24
Articulating How	.87#	.49	.39#	.21
Reasoning About How/Why	.16	.13	.18	.15
Years of teaching experience	.01	.02	.06	.15
SSTEW Overall Mean Score				
Noticing/Knowing How	-.03	.04	-.16	.21
Articulating How	1.01*	.40	.46**	.17
Reasoning About How/Why	.23#	.13	.25	.14#
Years of teaching experience	.02	.02	.15	.15
ECERS-3 Overall Mean Score				
Noticing/Knowing How	-.01	.03	-.05	.25
Articulating How	.63#	.33	.38*	.18
Reasoning About How/Why	.13	.11	.20	.16
Years of teaching experience	-.01	.02	-.09	.16

Table A9.4 Multiple linear regression analyses in the intervention group

School-level sample, original data (n=34, missing=1), robust standard errors.

ERS Oral Language Factor	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
R^2 = .17, Adjusted R_2 = .05, F (4,29) = 1.57, p=.208					
Noticing/Knowing How	-.01	.04	-.29	.777	-.07
Articulating How	.87	.52	1.69	.102	.39
Reasoning About How/Why	.15	.14	1.11	.277	.18
Years of teaching experience	.01	.02	.38	.705	.06
SSTEW Overall Mean Score	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
R^2 = .24, Adjusted R_2 = .14, F (4,29) = 2.38, p=.075					
Noticing/Knowing How	-.03	.04	-.70	.488	-.16
Articulating How	1.01	.43	2.35	.026	.46
Reasoning About How/Why	.23	.14	1.60	.121	.25
Years of teaching experience	.02	.02	.94	.355	.15
ECERS-3 Overall Mean Score	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
R^2 = .16, Adjusted R_2 = .04, F (4,29) = 2.06, p=.113					
Noticing/Knowing How	-.01	.04	-.18	.856	-.05
Articulating How	.63	.36	1.77	.087	.38
Reasoning About How/Why	.13	.12	1.13	.268	.20
Years of teaching experience	-.01	.02	-.51	.615	-.09

Table A.9.5 Standardised (β) and unstandardized (B) coefficients for ERS quality models in the control group School-level sample, original data (n=37), robust standard errors.

R^2 and adjusted R2 values generated using non-SEM multiple linear regression models

	B	**Robust S.E.**	**β**	**Robust S.E.**
ERS Oral Language Factor				
Noticing/Knowing How	-.06	.04	-.29	.19
Articulating How	2.12***	.53	.50***	.12
Reasoning About How/Why	.48*	.22	.36*	.16
Years of teaching experience	.06**	.02	.39**	.12
SSTEW Overall Mean Score				
Noticing/Knowing How	-.07	.04	-.37*	.18
Articulating How	1.89***	.50	.46***	.13
Reasoning About How/Why	.62*	.29	.49**	.18
Years of teaching experience	.05**	.02	.34**	.12
ECERS-3 Overall Mean Score				
Noticing/Knowing How	-.07*	.03	-.48*	.20
Articulating How	1.61***	.43	.53***	.14
Reasoning About How/Why	.49**	.18	.52**	.16
Years of teaching experience	.03#	.01	.24#	.13

Table A9.6 Multiple linear regression analyses in the control group

School-level sample, original data (n=37), robust standard errors.

ERS Oral Language Factor (n=37)	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
R^2 = .42, Adjusted R_2 = .35, F (4,32) = 8.41, p=.000					
Noticing/Knowing How	-.05	.04	-1.36	.182	-.29
Articulating How	2.12	.57	3.74	.001	.50
Reasoning About How/Why	.48	.24	2.01	.054	.36
Years of teaching experience	.06	.02	2.62	.013	.39
SSTEW Overall Mean Score (n=37)	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
R^2 = .41, Adjusted R_2 = .34, F (4,32) = 7.43, p=.000					
Noticing/Knowing How	-.07	.04	-1.62	.115	-.37
Articulating How	1.89	.54	3.53	.001	.46
Reasoning About How/Why	.62	.30	2.05	.049	.49
Years of teaching experience	.05	.02	2.46	.020	.34
ECERS-3 Overall Mean Score (n=37)	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
R^2 = .39, Adjusted R_2 = .32, F (4,32) = 7.80, p=.000					
Noticing/Knowing How	-.07	.03	-1.98	.057	-.48
Articulating How	1.60	.46	3.49	.001	.53
Reasoning About How/Why	.49	.19	2.57	.015	.52
Years of teaching experience	.03	.02	1.70	.100	.24

Table A.9.7 Standardised (β) and unstandardized (B) coefficients for ERS quality models testing Expert Term thresholds School-level sample, robust standard errors.

	Original data (n=71)				**FIML model (n=72)**	
	β	**Robust s.e.**	**B**	**Robust s.e.**	**β**	**Robust s.e.**
ERS Oral Language Factor						
Noticing How factor score	-.02	.16	-.00	.03	-.01	.15
Reasoning About How/Why factor score	.25*	.12	.29*	.14	.23*	.12
Use of Expert Terms (1 reported vs not)	.12	.12	.27	.27	.12	.12
Use of Expert Terms (2 reported vs not)	.28**	.10	.79**	.30	.28**	.11
Use of Expert Terms (3/4 reported vs not)	.44***	.12	1.30**	.36	.45***	.13
SSTEW Overall Mean Score						
Noticing How factor score	-.10	.16	-.02	.03	-.09	.15
Reasoning About How/Why factor score	.34**	.12	.38*	.15	.30*	.13
Use of Expert Terms (1 reported vs not)	.11	.11	.25	.25	.12	.12
Use of Expert Terms (2 reported vs not)	.30**	.11	.84**	.32	.31**	.12
Use of Expert Terms (3/4 reported vs not)	.42***	.10	1.21***	.32	.44***	.12
ECERS-3 Overall Mean Score						
Noticing How factor score	-.12	.18	-.02	.02	-.11	.17
Reasoning About How/Why factor score	.34**	.13	.28**	.11	.33**	.13
Use of Expert Terms (1 reported vs not)	.08	.12	.13	.19	.08	.13
Use of Expert Terms (2 reported vs not)	.31**	.12	.63*	.25	.31*	.12
Use of Expert Terms (3/4 reported vs not)	.38**	.11	.80**	.25	.38**	.12

Table A.9.8 Standardised (β) and unstandardized (B) coefficients for ERS quality models testing Expert Term thresholds School-level sample, robust standard errors.

	Original data (n=71)				FIML model (n=72)	
	β	Robust s.e.	B	Robust s.e.	β	Robust s.e.
ERS Oral Language Factor						
Noticing How factor score	-.09 (	.15	-.02	.03	-.09	.15
Articulating How factor score	.42**	.12	1.27**	.39	.42***	.12
Analysis Score (1 reported vs not)	-.11	.09	-.32	.27	-.11	.09
Analysis Score (2 reported vs not)	.32**	.11	.95**	.34	.32**	.12
Analysis Score (3+ reported vs not)	.19	.14	.55	.38	.20	.14
SSTEW Overall Mean Score						
Noticing How factor score	-.18	.15	-.03	.03	-.18	.15
Reasoning About How/Why factor score	.44***	.11	1.30***	.35	.44***	.11
Analysis Score (1 reported vs not)	-.04	.08	-.13	.22	-.04	.08
Analysis Score (2 reported vs not)	.36**	.13	1.02*	.42	.37*	.14
Analysis Score (3+ reported vs not)	.28#	.15	.75#	.42	.29#	.15
ECERS-3 Overall Mean Score						
Noticing How factor score	-.19	.16	-.03	.02	-.19	.15
Reasoning About How/Why factor score	.41***	.11	.88**	.25	.41***	.11
Analysis Score (1 reported vs not)	-.14	.09	-.30	.18	-.14	.09
Analysis Score (2 reported vs not)	.37**	.12	.78**	.28	.37**	.13
Analysis Score (3+ reported vs not)	.29*	.14	.58*	.29	.29*	.14

APPENDIX 10. Supplementary information relating to the ability of the OLP to assess change in knowledge, and to convergent validity

Table A9.2 Multiple linear regression analyses

N=94, clustered robust standard errors adjusted for 65 school-level clusters

Variance explained also shown for models excluding attendees less than 5 days

Noticing Factor	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
Full model: R^2 = .09, Adj. R_2 = .05, F (4,64) = 3.05, p=.023 *Model incl. intervention teachers with < 5 days attendance: R^2 = .11, Adj. R_2 = .07, F (4,56) = 3.50, p=.013*					
Intervention group status	2.74	1.17	2.34	.022	.24
Primary Qualified Teacher Status vs Early Years QTS	1.50	1.12	1.34	.186	.13
Years of experience teaching children aged 3-5 years	.15	.12	1.26	.211	.18
Years of teaching experience	-.06	.13	-.48	.630	-.08
Use of Expert Terms Factor	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
Full model: R^2 = .14, Adj. R_2 = .10, F (4,64) = 5.14, p=.001 *Model incl. intervention teachers with < 5 days attendance: R^2 = .21, Adj. R_2 = .16, F (4,56) = 5.44, p=.000*					
Intervention group status	.21	.06	3.21	.002	.31
Primary Qualified Teacher Status vs Early Years QTS	.10	.06	1.68	.098	.16
Years of experience teaching children aged 3-5 years	.01	.01	2.00	.050	.22
Years of teaching experience	-.01	.01	-.89	.376	-.11
Interpretation Factor	**B**	**S.E. (robust)**	**t**	**Sig**	**β**
Full model: R^2 = .03, Adj. R_2 =.-.01, F (4,64) = 1.14, p=.346 *Model incl. intervention teachers with < 5 days attendance: R^2 = .07, Adj. R_2 = .02, F (4,56) = 1.44, p=.232*					
Intervention group status	.09	.19	.49	.627	.05
Primary Qualified Teacher Status vs Early Years QTS	.26	.18	1.43	.158	.15
Years of experience teaching children aged 3-5 years	.00	.02	.04	.968	.01
Years of teaching experience	-.01	.02	-.48	.631	-.08

Table A9.2 Tobit regression analyses

n=94, clustered robust standard errors adjusted for 65 school-level clusters

Uncensored=51, left-censored (0)=43

Use of Expert Terms Sum Score Vignettes 1 and 2	**B**	**Robust s.e.**	**t**	**Sig**
F (4,90)=3.78, p=.001, Pseudo R^2=.03				
Intervention group status	.89	.37	2.40	.018
Primary Qualified Teacher Status vs Early Years QTS	.65	.39	1.65	.102
Years of experience teaching children aged 3-5 years	.05	.03	1.87	.065
Years of teaching experience	-.04	.03	-1.20	.235
Analysis Sum Score Vignettes 1 and 2	**B**	**Robust s.e.**	**t**	**Sig**
F (4,90)=.66, p=.62, Pseudo R^2=.001				
Intervention group status	-.39	1.04	-.38	.706
Primary Qualified Teacher Status vs Early Years QTS	1.44	.94	1.54	.128
Years of experience teaching children aged 3-5 years	.03	.09	.29	.775
Years of teaching experience	-.06	.09	-.71	.478

APPENDIX 11. OLP Video Vignettes

Excluded for copyright reasons