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Collective imaginary situation as a site of diagnostic assessment: A cultural-historical analysis of children's emerging science motive orientations in a Conceptual PlayWorld

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Abstract The chapter proposes a cultural-historical model of assessing children's learning and development that demands assessment practices to move from symptomatic assessments of learning to diagnostic assessment of children's maturing and emerging higher mental functions (e.g. logical thinking, focused attention, mediated memory, use of drawing marks or written words). Based on data from the digital educational experiment titled Conceptual PlayWorld@homeLIVE the chapter offers insights into how the concepts of social situation of development, zone of proximal development and dialectical relationship between the everyday and scientific concept could be used to understand children's motive orientations and to evaluate their maturing^[1] and matured psychological functions thus offering a holistic understanding of the psychological structure at a given cultural age period. Within the project, homeLIVE sessions were based on the characteristics of Conceptual PlayWorld (Fler 2018). Examples from a child's home setting are used to show how Conceptual PlayWorld can be used as an auxiliary tool to create condensed learning moments thus creating opportunities for both assessment and also to support children in giving their best performance. Through the Conceptual PlayWorld approach, the child is encouraged to explore their emerging psychological functions thus offering opportunity for new practices to emerge.

Introduction

Nearly two decades ago Fler and Richardson (2004) remarked that approaches to early years curriculum and pedagogy have acknowledged and, in many cases, also adopted (even if

reluctantly or partially) theoretical insights emerging from a sociocultural (read cultural-historical) approach but the same is not true for assessment practices. In contrast, assessment tradition in early years are located in Piagetian paradigm or theories that support age and stage based developmentalism. A sequential model of development helps in developing a normative standard around it. Internationally, large scale assessments are becoming increasingly common. In the background of the introduction of International Early Learning and Child Welfare Study (IELS) initiated by Organisation of Economic Cooperation and Development (OECD), Mathias Urban and Peter Moss have pointed out

“[New Zealander academics fear the IELS will lead to ‘teaching to the OECD measures’ and a consequent ‘pedagogy of compliance’, as governments are tempted ‘to call on the apparent precision of numbers to prescribe and measure context-free and curriculum-free internationally developed and validated outcomes over time’.” (Moss and Urban 2017, p. 254).

Carr et al. (2016) suggest this could be detrimental to the New Zealand’s early childhood sociocultural and bicultural curriculum. They argued for local and situated measures instead of large-scale testing and international comparison. McLachlan et al. (this volume, chapter 1) have reasoned against this absolutist position to suggest we should be concerned about the ‘poor use of data’ than the collection of data itself. The work in cultural-historical theory offers some insight on use of data, particularly on how can we weave assessment and pedagogy to best support children’s development in early years.

Arguing for a socio-cultural-situated perspective on assessment Gee (2007) remarked “many a standardized test can be perfectly ‘scientific’ and useless at the same time; in a worst-case scenario, it can be disastrous.” (Gee 2007, p. 364). Similar to Vygotskian argument he asks for lived social practices of the individual to be central to assessment. In reviewing the relationship between learning theory and assessment Baird (2014, p.5) argues that “sociocultural theory does not sit well with the current state of the field of assessment practice, in large part because standardised, same-for-all assessments have been equated with fairness in the minds of many”. Assessment practices have historically focused on issues of objectivity, criterion and administration of the test rather than the fundamental question of ‘why assess?’ (Drummond 2003). Gipps (1994, pp.3-4) puts it precisely that there are two important questions worth asking for in this context

1. “What is the assessment for?
2. What kind of learning do we wish to achieve?”

Gipps (1999) adds to these concerns by also alerting to the power relationship between student and teachers in the assessment. Thus, ‘who assesses’ is an equally important question.

The writings of Vygotsky (1987, 1998), Feuerstein (1979, 1980) and Lidz (1990, 1997) do offer a sociocultural/cultural-historical perspective on assessment. This chapter presents a synthesis of some of the theoretical discussions in cultural-historical theory and proposes Conceptual PlayWorld (CPW), a model of developing intentional teaching in early years, as an assessment tool that aligns with the essence of Vygotskian theorisation. The focus in the CPW is not on the individual performance of children on tasks, rather children, educators and their families together create a collective imaginary situation that offers opportunities for understanding children’s maturing and also already matured functions. The term maturing and matured function comes from the system of concepts in cultural-historical theory which hints at the “tripartite constellation of present age, maturing functions and next age as the objective zone of proximal development” (Chaiklin 2003). This theorisation thus refers to the psychological functions that are leading or central in a given age period and they need to be formed, for the child to progress to the next cultural age period. It is argued here that the collective imaginary situation created in the Conceptual PlayWorld creates possibility for new formations especially *conscious awareness* to emerge. The chapter is divided into following four sections: first, presenting a brief theoretical argument for cultural-historical approach in assessment; second, presenting the methodological aspects of using educational experiment for assessment and explains main characteristics of the Conceptual PlayWorld; third, showcasing data from a focus child’s participation in the Conceptual Playworld@homeLIVE and fourth, analysing and offering synthesis using Hedegaard’s dialectical-interactive approach.

Two key terms are used in this chapter that are fundamental for the new thinking on assessment in early childhood being proposed. One is the concept of maturing/matured psychological functions and the other is cultural age periods. Both cultural-historical terms are part of the system of concepts proposed by Vygotsky. Rather than ages and stages of development defining childhood development, cultural age periods suggest a child’s engagement in their world and how they agentially contribute to it, and it is this engagement that determines their development (rather than their age). Periods denotes what is likely to be a child’s leading activity at particular periods in their lives, such as to first communications with those around them, to want to play and imagine with friends, etc (see Vygotsky 1998).

Psychological functions, such as memory, imagination, are always in the process of developing, and a child's leading activity, such as to play, supports the development of the psychological function of imagination. This is a very different reading of development to that of a biological perspective where age is the defining character of a child's development. The fundamental argument presented here is- how one conceptualises development determines how they frame their assessment, and what markers of development they seek to capture and study. This chapter follows a cultural-historical conception of development and explicates some of its implication on the assessment practices in early years.

Assessing children in early years - A cultural-historical approach

In her book 'Assessing Children's Learning', Mary Jane Drummond directs early years educators to ask important questions about the purpose of assessment.

"Questions of what, when, where and how to assess are of secondary importance beside the more searching question of 'Why assess?' And 'Why assess?' implies 'Why educate?' Effective assessment can only be based on a thorough understanding-of our purposes in teaching and of our aspirations for our pupils." (Drummond 2003, p.12).

Graue (1993, p. 291) highlighted a disjuncture between assessment and pedagogic planning, she argued "assessment and instruction are often conceived as curiously separate in both time and purpose". In Vygotskian tradition, as Gipps (1994) has highlighted, "tester and pupil would collaborate to produce the best performance of which the pupil is capable, given help from an adult, rather than withholding such help to produce typical performance" (Gipps 1994, p.9). This distinction of a 'typical' performance and 'best' performance alerts us to the question of 'children's potentiality' in assessment. Instead of merely asking what and how questions it also guides assessment practices to ask "where to" question.

In his writings Vygotsky differentiated between symptomatic assessment and diagnostic assessment. His critique of the assessment paradigm is a powerful one and holds true even now where the focus of assessment stays with measuring certain symptoms that shows child's learning. He called this effort as *measuring the obvious empirically* and this is not going to help children's development. Drawing an analogy with diagnosis of headache he explicated,

"The patient complains of a headache; the doctor makes a diagnosis: the illness is a headache. This kind of diagnosis is essentially empty since the investigator adds nothing new to what he knew from observations of the patient himself and plays back

to the patient his own complaints, supplying them with scientific labels.” (Vygotsky 1998, p.205)

Merely finding scientific labels for the obvious challenge the child is facing in her/his learning cannot help to develop an explanatory power that could help to pedagogically intervene in the situation. He rightly pointed out,

“In the best case, we will be able only to increase precision of the symptoms and confirm them with measurement. But we can never explain the phenomena we observe in the development of the child nor predict the further course of development, nor indicate what kind of measures of a practical nature must be applied with respect to the child.” (Vygotsky 1998, p. 205)

The central concern in diagnostic testing “should be an assessment of what a child can do under the proper educational circumstances, rather than a tabulation of what he or she has learned to that point.” (Vygotsky 1993, pp.14-15). While critiquing the unidimensional nature of assessment and model of assessment around IQ testing Vygotsky explains that symptomatic assessment does not help making right intervention for the child.

“If a child is brought in for consultation with complaints that he is developing poorly mentally, has a poor imagination and is forgetful, if after investigation, the psychologist makes the diagnosis: the child has a low intelligence quotient and mental retardation, the psychologist also explains nothing, predicts nothing, and cannot help in any practical way, like the doctor who makes the diagnosis: the illness is a cough.” (Vygotsky 1998, p. 205)

The focus on child’s already developed functions and developing a deficit modelling around what child is not able to do Vygotsky argues does not help us to think pedagogically about the next steps which could support children’s learning. Offering direction for developing a holistic understanding of children’s development Vygotsky proposed,

“A pedagogue arrives at a diagnosis differently. He [sic] attempts to establish the particularities of a child's development at a specific moment. He is not interested in individual symptoms, or complexes of symptoms (syndromes); he is interested in their mutual limitations and relationships within a child's developmental mechanism as well as in the conditions determining this last. In Blonskii's phrase, *he must offer the whole picture of symptom-complexes, as well as an etiological analysis.*” (Vygotsky 1993, p.250, emphasis added).

Feuerstein's work on dynamic assessment has analogous theoretical commitments with Vygotsky's work on diagnostic assessment. Feuerstein (1979, 1980) offered a model that differed from the traditional testing approach in at least three ways:

- 1) Centrality of the role of the assessor. Assessor is not there in the setting to merely administer the test protocol but had an important pedagogic role to support the learner in successful problem solving.
- 2) Assessment focus on process and intervention rather than product or what learner knows already. Instead of focusing on what does learner knows already the dynamic assessment model focused on what how to support learner's emerging engagement with the problem-solving task.
- 3) Focus on the instructional setting of the learner.

Moreover, dynamic assessment procedures similar to assessment for learning approaches offer potentially useful suggestions for teaching thus challenging the divide of learning and assessment situation. As Lunt (1999, p.152) explains dynamic assessment “. . . involve a dynamic interactional exploration of a learner's learning and thinking process and aim to investigate a learner's strategies for learning and ways in which these may be extended or enhanced”.

Another important aspect would be to think about how is an assessment situation conceptualised. If we see an assessment situation merely as a moment to perform for evaluation, we segregate it from the learning moments. Meaning making makes learning valuable and easier (Shepard 1992). Moreover, the standardised model of assessing children deny role of cultural and historical factors in children's learning. As Bruner and Haste (1987, p.1) explains “(from) social life, the child acquires a framework for interpreting experience and learns how to negotiate meaning in a manner congruent with the requirements of the culture. ‘Making sense’ is a social process; it is an activity that is always situated in a cultural and historical context”.

The theoretical arguments put forward by Vygotsky, Feuerstein and then subsequent extension of their writings and work offers a fundamentally different approach to thinking about assessing children's learning and development. One fundamental difference would be to think of assessment as part of teaching-learning process that offers new possibilities of learning in a condensed form.

Assessment not as a tool for looking back but rather looking forward. As mentioned earlier, assessment thus become a pedagogic tool that explains ‘what does child know already’ and ‘how is child learning’ but more importantly it engages with the ‘where to’ question by

understanding the maturing psychological functions. To understand this argument further Vygotsky offers a system of concepts. Central to developing this cultural-historical understanding would be the following three concepts:

- Zone of proximal development
- Social situation of development
- Dialectical relationship between an everyday concept and a scientific concept

A further discussion on these concepts is presented in the subsequent section which would make it explicit on how these ideas contribute to developing a system that does not analyse individual learner's performance on a standardised task but rather an approach that takes child's social situation and her/his own development while thinking about children's learning and development.

Zone of proximal development

In his introduction to the book 'Vygotsky and Education', Luis Moll remarked

“The power of Vygotsky's ideas is that they represent a theory of possibilities. The construct of zone of proximal development reminds us that there is nothing “natural” about education settings (and about educational practices such as ability groupings, tracking, and other forms of stratification). These settings are social creations; they are socially constituted, and they can be socially changed” (Moll 1990, p. 15).

ZPD is extensively used as a concept to understand the interrelationship between the learner and more expert other during the teaching-learning process. The cultural-historical approach to learning and development emphasizes the importance of what the learner brings to any learning situation as an active meaning-maker and problem solver who act in and on the world. Therefore, it acknowledges the dynamic nature of interplay between teachers, learners and tasks and provides a view of learning as arising from interactions with others. It is important to acknowledge that all mediation does not lead to learning.

It is also important to highlight here that a careful reading of Vygotskian conceptualisation of ZPD suggests that “it is not a property of the child” (Chaiklin 2003, p. 43). ZPD indicates the “maturing functions not of a particular child but reflects the psychological functions that need to be formed during a given age period in order for the next age period to be formed” (Chaiklin 2003, p. 49). Evaluating or getting an estimate of the development of the functions which are not capable of independent performance could be important for designing pedagogic intervention. If the child is not capable of independent

performance the role of the adult and their pedagogic action need to be thought carefully. However, the role of the expert other in relation to the ZPD needs further elaboration in Vygotsky's own work. He obliquely hints at the possible directions in *Educational Psychology* (1996) the nature of the guidance or instruction was left to others to elaborate. In his discussion of Vygotsky and pedagogy, Daniels (2001, p. 55), for example, states "instruction was the driving force of development for Vygotsky". However, it is still fair to argue that Vygotsky did not elaborate in detail on the role of instruction in the ZPD. Consequently, this has given rise to several interpretations of the role of instruction as well as the ZPD itself (Wells 1999).

The concept of the ZPD figures prominently as a means for describing the way a child's intellectual capacity changes over time to reach new levels with the dialogic support of an adult or more capable peer (Wertsch 1984). Vygotsky first employed the idea of ZPD as a means of assessing a child's capacity to learn, rather than a way of thinking about pedagogy. Mercer (2006) points out that the concept usually deals with assessing individuals rather than understanding the quality of teaching-learning as an 'intermental' and 'interthinking' process. Quoting Erickson (1996) Daniels (2001) made a similar remark, "that much of the application of the ZPD concept is within dyadic settings with a single expert and a single novice...such a situation may not be typical of patterns of communication in learning situations." (Daniels 2001, p. 68).

Chaiklin (2003) has pointed out that that there is risk of the concept of ZPD being used in a loose and amorphous way if the focus on development is not acknowledged, pointing out that: "Vygotsky's concept of zone of proximal development is more precise and elaborated than its common reception or interpretation." (Chaiklin 2003, p. 39). Chaiklin's main argument is that the ZPD is all too frequently seen as a learning zone, rather than a zone which also involves the development of higher mental functions (e.g. memory, attention, imagination). These mental functions Vygotsky argued develops in children while interacting with others in their social situation, thus developing complex cognitive abilities e.g. focused attention, logical thinking, voluntarily controlled memory etc. His is a powerful argument which reminds us to follow three criteria while using ZPD:

"First, the model [of child development] must be explanatory, rather than descriptive. More specifically, the model should be organized by substantial principles that can explain development "as a single process of self-development" (Vygotsky, 1998b, p. 189). Second, the model should consider the whole child, as an integral person. Third,

childhood should be divided into periods, such that each period is characterized in a principled and unified way.” (Chaiklin 2003, p. 46)

The term model here is used to signify the importance of a holistic approach that explains the development of psychological structure, the interrelationships between different psychological functions. Chaiklin (2003) takes us back to Vygotsky’s conceptualisation of periodization in childhood which are characterised by changes in psychological structures, which can be seen as a set of relations among psychological functions such as perception, memory, speech and thinking. The central point worth highlighting here as Vygotsky remarked is

“Figuratively speaking, in determining the actual level of development, we *determine only the fruits of development, that is, that which has already matured and completed its cycle*. But we know that the basic law of development is that different aspects of the personality and its different properties mature at different times. While some processes of development have already borne fruit and concluded their cycles, other processes are only at the stage of maturation. A genuine diagnosis of development must be able to catch not only concluded cycles of development, *not only the fruits, but also those processes that are in the period of maturation*” (Vygotsky 1998, p.200, emphasis added).

Social situation of development

In his analysis of the development of the mind of a child, Vygotsky introduced the concept of ‘social situation of development, which denotes:

“the special combination of internal developmental processes and external conditions that are typical of each developmental stage and that condition both the dynamic of mental development for the duration of the corresponding developmental period and the new qualitatively distinct psychological formations that emerge toward its end.” (Bozhovich 2009, p. 66)

Children’s learning from this perspective takes place within institutional practices. Learning changes the person’s relation qualitatively with the practices the person participates in (Hedegaard 2012b). Rogoff (1990, 2003) and Hedegaard have elaborated upon Vygotsky’s seminal work and have provided further explanations of child development in the context of the child’s relationship with their social situation. Vygotsky’s approach to children’s development points at different development periods in relation to changes in the child’s

social situation. The concept of the social situation of development according to Hedegaard (2012a) is critical to understand the dynamic nature of children's development and to incorporate child's perspective in a given age period.

“The social situation of development represents the initial moments for all dynamic changes that occur in development during a given [age] period. ...The social situation of development specific to each age [period] determines strictly regularly the whole picture of the child's life or his social existence.” (Vygotsky 1998, p. 198, as cited in Hedegaard 2012a, p. 12).

Vygotsky in his writings has not emphasised “biological age in itself but [refers] to age period defined by societal traditions that then becomes reflected in the child's experiential relation to the world” (Hedegaard, 2012a pp. 11-12). This is an important insight for understanding how children negotiate different institutional demands as they engage in their schooling. In particular it allows us to distinguish between learning and development, by linking development, as the more significant change, with societal demands, such as starting school. Learning, though important, is evidenced by changing relationships with a social situation; while development arises from changes in the social situation, which themselves arise through the structuring of society. These distinctions are helpful when considering the differences in demands faced by children from diverse backgrounds and wide-ranging experiences in different contexts. Vygotsky's conceptualisation around age period is guided by two interrelated concepts- social situation of development and age-specific neo-formations. These neoformations Vygotsky theorised “characterize the reconstruction of the conscious personality of the child in the first place are not a prerequisite but a result or product of development of the age level...This is why maturation of neoformations never pertains to the beginning, but always to the end of the given age level”. (Vygotsky 1998, p. 198).

In addition to social context, culture has been given a significant importance in the cross-cultural and sociocultural research on children's education that builds on Vygotskian ideas. In drawing upon a large corpus of cross-cultural research, Rogoff (1990, 1998, 2003) also highlights the importance of examining culture to understand development, arguing that “development can be understood only in light of the cultural practices and circumstances of their communities—which also change. In essence, culture determines not only the principles for defining development but also frames the contexts in which the development of children

is supported (Rogoff 2003, pp. 3–4). Vygotsky. (1994) explained that “the influence of environment on child development will, along with other types of influences, also have to be assessed by taking the degree of understanding, awareness and insight of what is going on in the environment into account” (Vygotsky 1994, p. 343)

Rogoff et al. (1998) argued that we need to begin to understand “the development of children in the context of their own communities” and this requires the “study of the local goals and means of approaching life” (p. 228). She explains that the socio-historical approach assumes that individual development must be understood in and cannot be separated from the social context. The fundamental message which Vygotsky’s work is alerting us to is that learning is not a way of coming to know about the social world but, rather, a way of inhabiting or being in it.

Dialectical relationship between everyday and scientific concepts

“A concept is, as it were, a condensation of assessments, a key to a whole complex consisting of them, their infrastructure” (Vygotsky 1994, p. 279). Vygotsky distinguished between development of scientific and everyday concepts in terms of their characteristics and how they were acquired. “Compared with spontaneous concepts, he argues, scientific concepts have four features which the former lack: generality, systemic organization, conscious awareness and voluntary control” (Wells 1994, p. 1). Wells (1994) further explained that out of these four features, the first two are the criteria to label a concept ‘scientific’; what distinguishes this category of concepts is not the fields to which they apply but “the way in which - whatever the field - they relate to experienced ‘reality’” (p.1). Everyday concepts are related directly to the world of experience; while scientific concepts are abstractions and contain meanings which may be generalised, but which are constrained by what the learner is able to bring to their acquisition. Wells explained:

“While the first two features serve to define the way in which scientific concepts differ from everyday concepts, the second two features, by contrast, are better seen as more general characteristics of a stage of mental development that is associated with, and perhaps dependent on, their acquisition. For this reason, although the two sets of features are different in scope, they are also interdependent” (Wells 1994, p. 1-2).

Scientific and everyday concepts therefore differ in the manner in which they are acquired. Unlike everyday concepts, which Vygotsky (1987) suggests are appropriated spontaneously by the child through the social interaction that occurs while engaging in activities in his or her

immediate community, scientific concepts are largely acquired as a result of deliberate and systematic instruction in an educational setting.

Although both everyday and scientific concepts develop in communication, one mainly out of school and one mainly in school, schooled discourse represents a qualitatively different form of communication because words act not only as means of communication, as they would in everyday discourse, but as the object of study. In classroom interactions, the teacher directs the children's attention to word meanings and definitions and the systematic relationships among them that constitute an organized system of knowledge. Formal instruction, with its special organization and discourse, through its social and semiotic mediations, helps develop a general, self-contained system of words and their relationships (Gallimore & Tharp 1990). Through formal instruction, children develop the capacity to manipulate consciously this symbolic system.

Vygotsky also emphasized that everyday and scientific concepts are interconnected and interdependent; their development is mutually influential. One cannot exist without the other. It is through the use of everyday concepts that children make sense of the definitions and explanations of scientific concepts. That is, everyday concepts mediate the acquisition of scientific concepts. However, Vygotsky (1987) proposed that everyday concepts also become dependent on, are mediated and transformed by the scientific concepts; they become the "gate" through which conscious awareness and control enter the domain of the everyday concepts (p. 193). Thus, he wrote, scientific concepts grow down into the everyday, into the domain of personal experience, acquiring meaning and significance, and in so doing "blaze the trail for the development of everyday concepts upward toward the scientific" and facilitate "mastery of the higher characteristics of the everyday concepts" (p. 219). Vygotsky also described,

"The development of the scientific ... concept, a phenomenon that occurs as part of the educational process, constitutes a unique form of systematic cooperation between the teacher and the child. The maturation of the child's higher mental functions occurs in this cooperative process, that is, it occurs through the adult's assistance and participation" (Vygotsky 1987, pp. 168-169).

The Vygotskian literature explains this movement in terms of the idea of mediation. Vygotsky (1978) claims that the secret of effective learning lies in the nature of the social interaction between two or more people with different levels of skills and knowledge. This involves helping the learner to move into and through the next layer of knowledge or understanding.

According to a Vygotskian approach, this transition from social to personal happens not through interaction but during (in) interaction (Ellis, 2000).

The concept of ZPD, SSD and everyday and scientific concept could guide us in thinking about assessment in a fundamentally different way where it encapsulates robust understanding of child's social situation, their motives of participation in the activity setting and also how concept learning happens in children at different cultural age periods. This study uses educational experiment as a methodological tool to show how a meaningful setting could be created in the child's environment that could offer new possibilities of learning and assessment.

Conceptual PlayWorld: Educational experiment as a methodology for assessment

As a methodological approach for intervention in the family homes Conceptual PlayWorld follows principles of double move as delineated by Hedegaard (2002, 2005). Conceptual PlayWorld for families is a planned intervention that is jointly developed by parents/caregivers and researchers.

Following Davydov's (1962, 1964, 1998) work Hedegaard (2008) has argued that "the educational experiment is a multi-faceted planned preparation of teaching which has, as its goal, the creation of optimal conditions for the learning and development of the participating children" (p.185). Children's play and storytelling which are part of their everyday life are used as a collective space for joint problem solving or exploration.

We have argued elsewhere (see Fler, Fragkiadaki & Rai 2020) that Conceptual PlayWorld as a model of intervention creates a condensed and amplified experience for children. We are extending this argument, to highlight that child's learning in the Conceptual PlayWorld is seen:

1. "in-motion
2. beyond fossilised complete forms
3. the past in the present, and
4. where the researcher has a central role in developing practice in collaboration with teachers/families" (Fler, Fragkiadaki & Rai 2020, p.57)

The five characteristics of a Conceptual PlayWorld were conceptualised in relation to Vygotsky's conception of development, and are summarised as follows:

1. *Selecting a story for the collective imaginary play*: the story has to be dramatic that offers possibility for developing new tensions and has an engaging plot, relevant to the children's cultural age period and their interest. It has to be enjoyable for both the children and their parents (e.g. the drama of Rosie, the hen being chased by the fox on a farm).
2. *Designing the imaginary spaces*: the story teller has the leading role to design the imaginary space. It has to careful think both of the digital sessions of 30 minutes and what families could do in their home settings afterwards. So, while designing the space the team of researchers and story tellers had to think of the physical spaces in the home and also the digital spaces which they share (e.g. making a replica of the farm and a hutch, wearing a crest or hair band to be in the character of Rosie, the hen or bringing a soft toy or a puppet to represent fox and her mother).
3. *Entering and exiting the imaginary situation*: being in role, children, their families and story teller all enter together in the imaginary situation. They decide signs like singing a rhyme together or walking like a hen or moving a magic wand as a sign of entry or exit from the PlayWorld. This entering and exiting the playworld together hints to the children that they are now in character in the Conceptual PlayWorld.
4. *Planning a problem to be solved*: the story teller carefully extends and introduces new character and drama in the story. This offers opportunity to introduce an already planned problem situation to the children. The drama of the story engages children and they are offered new concepts by the story teller and parents to solve the problem. As children are trying to solve the problem, they become more aware of the concepts.
5. *Planning the roles in the imaginary play*: the story teller and researchers planned the roles together so that adults in the home settings and other children could play together. Conceptual PlayWorld offers possibility of adding new characters to the emerging drama of the story (e.g. the parents could take the role of a fox, Rosie's mother or Rosie's younger sibling, they could also be a wise Grandma hen who can offer advice to solve the problem).

The Conceptual PlayWorld model creates new developmental conditions in condensed forms that could amplify children's imagining and conceptual development. In the context of

Conceptual PlayWorld, children's imagination is the central object of inquiry but it also takes into consideration a number of bordering and auxiliary concepts (e.g. child's agency, logical thinking, tool-mediated action to explain children's concept formation). Thus, the effort is to move beyond the stimulus response relationship to a wholeness approach that analyses children's social situation of development to understand their learning and development.

Conceptual PlayWorld@homeLIVE: A digital educational experiment

The study reported here was done in Melbourne during the months of Oct-Dec 2020 during the coronavirus pandemic. A new model of digital practices was developed following the five characteristics of the Conceptual PlayWorld. A seven-phase model of practice was followed to develop a responsive space using zoom meeting platform. The effort was to create new developmental condition in the home setting for children's STEM concept formation in early years. Mentioned below are the phases of the implementation of the ConceptualPlay@homeLIVE educational experiment which was developed based on children's storybook *Rosie's Walk* by Pat Hutchins.

Phase 1: Understanding children's social situation of development

Collaboration with the participants is one of the central features of the educational experiments. To develop a collaborative relationship with the families and to understand their children's social situation of development we did interviews where we asked questions about children's everyday routines, their interests, family's expectations from the Conceptual PlayWorld sessions and finally sharing our expectations and ideas about PlayWorld. This process helped to understand the peculiarities and commonalities in the home practices. Understanding each child and his existing developmental conditions were important part of designing these educational experiments. These details were discussed among the team members which worked on the design of the Conceptual PlayWorld based on children's book *Rosie's Walk*.

Phase 2: Sharing ways of participating and inhabiting a Conceptual PlayWorld

Conceptual PlayWorld was a new concept for the families. A short video by our story teller and further details on expectation from the parents when they will participate alongside their children was shared with the families.

Phase 3: Bi-weekly Conceptual PlayWorld sessions

The main part of the intervention was bi-weekly Conceptual PlayWorld sessions. These sessions were weaved around a children's storybook. Children and caregivers played, embodied actions from the story and together explored and solved the problem. These

sessions were immediately followed by debrief meetings and planning for the next session. These meetings especially were space among the researchers and story teller to discuss their assessments about each child and their family's performance.

Phase 4: Sharing resources with the families for creating a Conceptual PlayWorld in the home setting

While the sessions by the story teller were well participated by the families the challenge was to sustain the narrative. Video resources that children and parents could watch together, activities like origami which children can learn alongside the story narrative of the PlayWorld and fact sheets which children can read with their elder siblings or parents were shared so that families could create more meaningful interactions around the story which children were doing in the Conceptual PlayWorld.

Phase 5: Creating opportunities for family's participation

At the beginning of each session and also during the sessions a deliberate attempt was made by the story teller so that families could share their own PlayWorlds. As a first step they were asked to share retelling of the story with their children. Family's enthusiasm and their effort to bring children's toys and everyday artefacts from their home setting to share the story helped to understand family's engagement and how their children were learning in the Conceptual PlayWorld.

Phase 6: Making conceptual development visible

One of the prime focus of the PlayWorld is development of STEM concept. After introducing an emotionally engaging problem for the children, the effort was to capture the process on how children were making an attempt to solve the problem.

Phase 7: Parent's forum to share their experience

A parent's forum was organised at the end of the four weeks programme to understand parent's feedback and to learn about the Conceptual PlayWorld they developed with their children in the home setting.

Conceptual PlayWorld@homeLIVE: Who, what and how

Total 12 families and their children participated in a bi-weekly 30 minutes Conceptual PlayWorld session with a story teller. The families were recruited through the Playgroup Victoria's network. The 12 families were from Chinese, Vietnamese, Indian, Spanish, Irish and Australian ethnicities. Seven boys and five girls in the age range of 2 year 11 months to 4 year 9 months were part of this research.

Before children joining the PlayWorld a detailed interview with the parent/s were conducted to understand their children's interest, daily routine and expectations from the PlayWorld sessions. All the sessions were recorded using zoom's online recording tool. All the families participated with their video turned on, which shows the trusting relationship with the storyteller. In addition, families also shared short video clips from their home settings when they were with their children in the Conceptual PlayWorld. The video data were downloaded to a local hard drive and analysis was done using video data and not by transcribing them. Only relevant sections needed for presentation in this paper were transcribed. Using video footage helped in unpacking children's motives and participation better in this educational experiment. Following Hedegaard & Fler's (2008) dialectical-interactive approach three layers of analysis-common-sense interpretation, a situated practice interpretation, a thematic interpretation was done to understand children's motives of participation in the setting and also to make their learning visible for assessing their developing understanding. More efforts were placed to understand the intentional orientation of the participants and an effort was made to look at data to understand it how Conceptual PlayWorld is influencing the developmental condition of the focus child. The following theoretical conceptions outlined in Hedegaard's analysis were focus of the analysis at this level:

- i. "The intentional orientation of the researched person
- ii. The ways of interaction between participants (interaction patterns)
- iii. The conflicts between different person's intentions and projects in the activity
- iv. The competence and motives that can be seen in the researched person's interactions in his or her social situations" (Hedegaard 2012a, p. 58).

While synthesising these understandings at the thematic level effort was made to formulate explicit relations using theoretical concepts. The concept of SSD, ZPD and scientific concept development were specifically used to find patterns and make theoretical claims based on the interpretation of parents and their children's motive orientations in the activity setting.

What did we learn?

This section presents data from one of the focus child Lexi to show how a model of assessment informed by cultural-historical theory was used to develop a holistic understanding of child's learning and development. Lexi and her mother (Cara) participated in total 7 out of 8 PlayWorld sessions.

Understanding Lexi's social situation of development

Lexi's family is from Australian and Chinese ethnic origins. At the time of joining the Conceptual PlayWorld she was 4 year 5 months. She spoke English at home and had a younger one-year old sister. Both the sister participated in the sessions together with their mother Cara. Before lockdown due to Covid1-19 pandemic she was attending 3-year-old kinder for one day on Monday. The parents were very concerned about their child not getting enough stimulation and learning in the lockdown. As an alternative Cara has registered for a number of online classes for Lexi. Apart from a number of Playgroup sessions she also does an online music class.

Table 1: Everyday activity record of Lexi

Time of the Day	Activities children engage in (both at home and in other institutions and settings)
Morning routine (Wake up time – 1:00pm)	Get up early around 6, breakfast and some playgroup sessions. Lexi does regular playgroup sessions in the morning hours on Tuesday and Friday. She was also doing a session called 'inspiring minds' where the focus was on emotional regulation/development of children on Mondays. Similar to PlayWorld the educator uses to read an online story. They also do half an hour online music session every Wednesday, this was continuity from the in-person music sessions she use to attend before the lockdown. They also watch TV shows and especially Playschool in the morning hours, then Sesame street. The girls then have free play, Lexi enjoys playing with her dolls.

Post lunch routine (1:00pm - 5:00pm)	<p>Then there is a lot of imaginative play. Children play outside, sometimes they also go to the nearby park. Some days, especially on a warm day Lexi plays with water table and sand. The younger sister is one year old and that has restricted the possibility of Lexi going out during the day, she sleeps twice a day and that leaves less time to go out. Lexi's father has got paternity leave and he has got Tuesday and Friday off. Lexi loves colouring and drawing and sometimes she enjoys doing it her father. The children also do craft activities with their grandmother every week. Cara's mother comes every week.</p>
Evening/bedtime routine (5:00pm - Sleep time)	<p>Both the girls have their own book selves. Cara values book reading and every evening before bed time Lexi chooses her own book. Lexi also enjoys finding different characters or objects in the book. Cara said they have a variety of books including the ones they read when they were children. After bed time story Lexi also listens to an app that is focused on bedtime meditation. She plays it before sleep, that calms her down.</p>
Weekend <i>(In case your routine is different from the weekdays)</i>	<p>Weekends have similar routine at the moment due to lockdowns. The grandmother is able to visit at least once a week and that day children play with her.</p>

The mother thought during the lockdown her daughter's skills of participating in online sessions have improved. Lexi is generally very social but not very engaged in online classes. Cara shared that "she's gone from not wanting to engage with others on the online classes to putting up her hand". The mother also felt that children as young as four-year-old are able to "learning to pause, unmute and wait for turn". Lexi is also learning that "the teacher is not always going to pick you, even though you've got your hand up". Cara thought there is lot of social learning happening through online meetings which is good and necessary for children.

Understanding Lexi's maturing psychological functions and interest

In her conversation Cara shared Lexi really like to dramatise and role play. She like adding her imagination to play. Cara shared that unlike her cousin Cloe who does not like role play, Lexi takes leadership in developing her play. In her interview Cara highlighted that “Lexi loves to draw; she writes but her writing is still in pre-writing stage. She loves colouring” (C...). It is a nice quiet activity for her. Lexi is not “keen on engaging with what others are saying, she is keen on sharing her ideas”. Cara reported that Conceptual PlayWorld sessions were “good for her in many ways as she was meeting other children, her age, she gets to see them doing the same thing.”

The collage above shows images from Lexi's participation in the Conceptual PlayWorld (from L-R clockwise: i) Lexi and Cara role playing the story, ii) Lexi and Cara walking like a hen in the farm, Lexi's younger sister also joins in, iii) Lexi role playing as a hen beyond the Conceptual PlayWorld setting, iv) Lexi showing her get-home-machine.)

Lexi's participation in collective imaginary situation of the Conceptual PlayWorld

The participation with other children in the collective drama extended beyond the sessions. Cara mentioned that “after the sessions she would ask me if I would like to play with her. If I could be rosy or if I could be the Fox and yeah, I noticed she wanted to extend on the narrative. So, she's sort of at that stage where creative and imaginative play is really; it's her thing. And, and I think the, introducing her to these concepts and the language as well through, um, I would say through fun, relaxed narrative of play. Is what really worked for Lexi, because I hear how she is using the vocabulary now and making connections.” This learning of new vocabulary was one of the central features which were becoming explicit as Lexi was participating in the PlayWorld. The mother also shared that “initially Lexi was intimidated by some of the, um, I guess when the challenge of making your own get-home-machine came, um, yeah. Lever and fulcrum, so she wouldn't attempt it. And I, I hadn't seen that for a very long time. Lexi avoiding or like being afraid to attempt something. And then, and then it wasn't long before, like the next session, um, where everybody else was sharing, what they had made, which was, it was just so wonderful sort of.” The collective imaginary situation also motivated the child because “seeing that other children, even younger than herself, had a go with their parents to make their own things. Um, yeah. Um, well she called them see-saw so yeah, I think that was fantastic. And it just, um, showed her that it was possible. And yeah, I think all that, um, fear went away when she could see the

examples of what other kids had made with their parents.....it was nice that we managed to have a bit of a collective approach”

Weaving pedagogy and assessment: Synthesis from a cultural-historical perspective

The narrative from the parent above and data from Lexi’s participation in the Conceptual PlayWorld showed that there were two dimensions to this assessment process. On the one hand researchers and parents were collaborating to develop a holistic understanding of the child’s social situation of development. Second and equally important was to develop a collective activity setting where the child could feel motivated to bring their learnings and also get inspired by other children’s learning. Vygotsky (1998, p.201) explained that “it is assumed that independent solving of the problems only and exclusively is indicative of the mind”. The data from the focused child Lexi shows that her problem-solving abilities and her motive orientation changed as she observed other children’s participation in the activity setting. Children in the Conceptual PlayWorld were able to express their emerging and existing understandings in a trusting relationship with the storyteller. A robust understanding of the child’s social situation of development helped the research team to think carefully about the problem situation which children of a particular cultural age period would find engaging and motivating.

Figure 1: Figure representing the assessment practice model in the Conceptual PlayWorld

The consistent focus on the child’s social situation of development and their maturing psychological function helped to make assessment in the Conceptual PlayWorld a responsive and sensitive process that informed pedagogy. The child and her family were collaborator in this educational experiment thus they were share localised situated and unique context of their child’s learning this helped story-teller and researchers to have a more authentic assessment of child’s developing psychological functions (of imagination and problem solving) and the science concept of lever which was the focus of this Conceptual PlayWorld.

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One of the main characteristics of the Conceptual PlayWorld is to bring together children’s emerging psychological function of imagination, problem-solving, their affective expressions all as part of this new condensed practice. The introduction of an ‘ideal’ form (Vygotsky 1998) of practice that could engage children in gradually learning of science concepts was

possible by developing a robust understanding of children's social situation of development and their unique relationship with the world. In the case example mentioned here the child's access to farm life, child's capability to engage in mature role play (cultural age period) and offering a problem scenario within children's play narrative helped in making their concept learning visible. The focus in weaving pedagogy and assessment then is not on slicing children's individual psychological functions but rather see an emerging relationship between them. The interrelationship between higher psychological functions viz. problem solving and imagination was visible in the example. Thus, the approach here is to think about the development of a 'psychological structure' (Chaiklin 2003) that strengthen relationship between set of psychological functions.

Conclusion

The model presented above (figure 1) shows an emerging conceptualisation of children's assessment informed by cultural-historical theory. Conceptual PlayWorld as an educational experiment creates condensed activity setting that amplifies children's could be seen as an intervention that builds on the spirit of this message. This idea aligns with Drummond's (2003, p. 13) claim that as a part of teaching-learning process assessment must "enrich their lives, their (children) learning and development" (p.13).

One of the first step we must take is to acknowledge that the relationship between the "chronological age and the standardised age of the child...is only the first step along the way toward diagnostics of development" (Vygotsky 1998, p. 200). The focus of assessment should be on new-formations as they emerge. A keen observation of child's social situation of development can alert us to the basic contradiction between the child's current capabilities (as manifested in the actually developed psychological functions), the child's needs and desires, and the demands and possibilities of the environment. In the Conceptual PlayWorld as the child engages in different tasks or problem solving within the collective imaginary situation it results in the formation of new functions or the enrichment of existing functions. Conceptual PlayWorld conceptualises assessment as a practice that allows the use of auxiliary tools and create condensed learning opportunities thus producing best performance. Instead of assessment models that looks at previous learning, the cultural-historical assessment presented here demands us to look at the past, present and future together as a focus of pedagogy. Assessment thus is not separate from learning but following an educational

experiment model it integrates pedagogy and assessment in developing a transformative and collective imaginary situation that could support children's concept learning.

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[1] The terms maturing functions draws from the systems of concepts in cultural-historical theory, here it is used to signify the tripartite constellation of present age, maturing functions and next age. Seen in this way it refers to the genesis and development of new psychological structures at a particular age period.