Children’s theorising about their world: Exploring the practitioner’s role

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THE DEVELOPMENT OF ‘WORKING THEORIES’ is a key learning outcome for New Zealand’s early childhood curriculum *Te Whāriki* (MoE, 1996, p. 44). Working theories are described as combinations of knowledge, skills and attitudes which support children’s developing understanding of the world, and guide their actions, problem solving and learning. This article reports research into the working theories of a group of children in one early childhood setting, and argues that working theories serve a variety of purposes linked to effective action within children’s specific sociocultural contexts. This, and the fact that the social and cultural context provides resources with which children construct working theories, is used to argue a case for sociocultural pedagogies to support children in creating and modifying working theories. A case study is provided from the author’s research. With recognition that the implementation of sociocultural pedagogies is somewhat difficult for early childhood practitioners (Anning, Cullen & Fleer, 2004), the article offers some specific strategies related to supporting children’s working theories.

**Introduction**

‘Working theories’ form one of the two learning outcomes of New Zealand’s early childhood curriculum *Te Whāriki* (MoE, 1996). Working theory is a term relatively unique to this curriculum, and summarised in the early childhood assessment exemplars as ‘another name for knowledge’ (MoE, 2007, Book 13, p. 4). Deceptively simple perhaps, this notion of ‘working theories as knowledge’ has received little attention in research or teachers’ professional development, in contrast to the other named outcome of the curriculum, learning dispositions (Hedges & Jones, 2012; Meade, 2008). Recent research makes clear that there is a lot more to understand about children’s working theory and the way teachers respond to this outcome of learning (Hedges, 2011; Peters & Davis, 2011).

Working theories can be seen as tentative and transitional outcomes of children’s processes for developing coherent and meaningful knowledge. These theories are subject to modification as the child gains experience and information (Hedges, 2008; Peters & Davis, 2011). This article draws on literature to explore the concept of theory and particularly working theory, before introducing how I explored children’s working theories in my own research. I give some examples of working theories from the study I conducted, then go on to describe pedagogical approaches, informed by sociocultural theory (Daniels, 2001; Rogoff, 2003) and complexity theory (Davis & Sumara, 2006), that were found to support children to create and develop working theories. These are illustrated by an extract from the research data.

**Literature review**

Working theories are described in New Zealand’s early childhood document *Te Whāriki* as being formed of knowledge, skills and attitudes that are ‘increasingly used for making sense of the world, for giving the child control over events, for problem solving and further learning’ (MoE, 1996, p. 44). In conjunction with the document’s aspiration statement for confident, healthy, contributing and capable children, the concept of working theories emphasises children’s agency in constructing knowledge, skills and attitudes that influence dispositions which encourage learning. Working theories, over time, develop to become more elaborate and more useful for making sense of the world (MoE, 1996, 2007). The usefulness of theories for explanation, prediction and technology is commonly accepted by writers in the cognitive psychology literature (Christmann & Groeben, 1996; Gopnik & Meltzoff, 1996; Inagaki & Hatano, 2002).
Cognitive psychology defines theorising as making connections between experiences and events, identifying causal relationships (Gopnik & Meltzoff, 1996; Inagaki & Hatano, 2002), and connecting concepts to ‘an at least implicit argumentational structure’ (Christmann & Groeben, 1996, p. 48). Creating theories of any kind requires the ability to think about and treat pieces of knowledge as independent items, removed from the practical situations to which they might apply (Wells, 1999), and manipulating them into a theoretical order. Therefore, theory building requires a reflective stance to activity and experience (Wells, 1999) and a shift to a more abstract way of knowing. Theories, like models and schemas, help people to organise and structure the knowledge they have about a subject matter, to recognise interconnections between different bits of information and how they function together (Anderson et al., 2001). This is then important for constructing solutions to problems and adapting understanding, skills and expertise to different scenarios in everyday life (Schneider & Stern, 2010). Both the creation and application of theories are complex cognitive tasks.

Children’s theories are described as ‘working’ theories, suggesting the child’s theories are not fixed, but provisional and subject to modification, ‘something being elaborated, developed or tuned’ (Peters & Davis, 2011, p. 11). Arguably all theories are provisional, as they represent an individual’s, or society’s, current best guess at explanation of a phenomena. Te Whāriki emphasises not only the generation of working theories, but also their modification. As theories are formed of connections between pieces of knowledge, the modification of working theories can occur through the addition of new pieces of knowledge and the formation of new connections, so that the incorporation of new learning, experiences and information leads to refinements and extensions of the theory (Hedges, 2008; Peters & Davis, 2011). Working theories become an important way in which children learn, apply and understand information and experience, structure their increasing knowledge from a variety of sources, and take control of their world. With an understanding of the importance of this cognitive activity, I was interested in exploring children’s theorising processes further, to examine what contribution I, as an early childhood practitioner, could make to support children’s working theories. This was the focus of my masters’ study.

Methodology

The study took the form of a qualitative self-study of my practice as an early childhood practitioner working with young children around their working theories. Four related curriculum activities were observed and analysed. The approach was informed by a ‘living theories’ methodology (Whitehead & McNiff, 2006), which argues that knowledge is to be found in lived practice and therefore involves practitioner self-study. I sought to develop knowledge and understanding of children’s working theories and the practitioner’s role in their formation and modification through investigating and refining my own teaching practice. The ‘living theories’ approach, in assuming an action research methodology (Whitehead & McNiff, 2006), takes into account the personal, value-based nature of any research. In particular, the approach argues that enquiry should aim to enact, and be evaluated against, the practitioner’s values and intentions (McNiff, 2009). This study gave emphasis to developing theories as a cognitive skill over constructing ‘correct’ theories, and important values included creativity, diversity and multiplicity.

Participants

All children and their families in the centre aged two and over were invited to participate in order to enable greater flexibility during videoing. Consent was obtained for 26 children and families; five families declined or did not return consent forms so their children were excluded from data collection. Children were free to choose in the moment whether to participate, as was normal practice for all activities in this free-play environment. Children without consent could take part but were not videoed, nor were any recorded verbal comments of theirs included on the transcripts. Twelve children in total participated, all three and four years old, with up to eight children involved in each activity.

Methods

Four related curriculum activities, which had emerged out of children’s interest in creating earthquakes in the block corner, provided opportunities for a close examination of children’s working theories. The activities took place in March 2011, after a large earthquake had occurred in Christchurch, New Zealand. This event was dominating both news’ broadcasts and adults’ conversations, as an event of national significance it had filtered into the curriculum of the program as well. The four activities were videoed and transcribed, while I facilitated the activities and interacted with children throughout. Therefore several related group activities with myself as participant–researcher formed the context of the observations.

In the first activity, children looked at documentation from the centre about a child building with blocks and then creating an earthquake, following which I invited children to create their own earthquakes as a curriculum activity. In the second activity, children reviewed documentation from the first activity, and then I invited them to drawing their thinking about earthquakes. The third activity involved children in creating their own documentation, this time about a trip to the shopping mall. The final
activity challenged children to try to make a house that didn’t fall down in an earthquake. Each activity was initiated by myself as the practitioner, following observation of what children were engaged in within the daily program. The activities took place at roughly monthly intervals, during which time I transcribed, analysed and reflected on emerging findings in relation to my aim to discover effective ways to support, extend and encourage children’s working theories.

Analysis

To make sense of children’s working theories and the practitioner’s role in relation to these theories, I read the transcripts of the videoed activity closely. Children’s working theories were identified by function (prediction, explanation, persuasion) and by structural features (consisting of several connected assertions). For example, the theory that earthquakes were caused by a monster who ‘lifted up the house and shook it’ offered an explanation and was based on several premises: earthquakes involve shaking; to shake something you have to pick it up; monsters are big and can pick up houses.

Following the identification of the children’s working theories, a grounded theory approach was employed for analysis of the practitioner role, to identify concepts and approaches that seemed to support children to create and develop their working theories. The findings from previous activities informed subsequent activity, enabling me to apply insights from previous activities and experiment with possibilities suggested by the emerging data. The time frame of monthly activities enabled me to test and modify my own provisional working theories about the practitioner’s role in supporting the children’s working theories.

Findings

I provide here an extract from one particular episode in order to explore how others (peers and teachers) use particular strategies to help children create and modify theories about their world. I will then draw examples from this transcript to illustrate my findings about children’s working theories and about the practitioner’s role.

I [Vicki] suggest to two children ‘would you like to come and do some talking and thinking about earthquakes?’ They respond ‘no’. To another child I ask ‘would you like to come and do some talking and thinking about earthquakes with me? Would you like to build little houses and then make an earthquake come?’ We move to a table inside the centre. It has room for about six children to work comfortably. Behind us are the art shelves with paper, pencils, paint, sellotape, boxes and collage items. I have also moved the block trolley over and stacked some large blocks on it, as well as the baskets of bears, people, road tiles, and bottle lids that it usually contains. The session recording begins with me reading the documentation to the group of seven children, one of whom has already started building. I ask this child if he can make an earthquake happen to his building. He places his hands on top of his buildings and shakes the blocks from side to side. The building breaks, and another child comments ‘Let’s do it again’. I invite all the children to start making buildings so we can make more earthquakes. The children begin building with intense concentration. Sabrina, Benson, Sefa and Izzy are soon pushing their buildings over (as earthquakes). Eloise, Tilly and Damien create more elaborate buildings, with Damien creating space for his plastic bear’s (bottle-lid) car, and Tilly suggesting that bottle lids could make a chimney.

Vicki: How are you going to make the earthquake happen on yours? [to Eloise]
Sabrina: Need to [pause] … The other kids do it like this [she knocks her building over with hands pushing blocks back and forth].
Vicki: Oh yeah a bit of a shake [pausing 2 sec].
Damien: I was shaking it, but it fell.
Vicki: What about if the shaking came from somewhere else?
Sabrina: A monster shaking in the house.
Vicki: What about if a monster was inside the house shaking it?
Sabrina: No it lifted up the house and shook it.
Sefa: Man like this hey [pausing 1 sec] you’re breaking my house.
Vicki: Is that what the monster said?
Sefa: That’s what the people said.
Damien: [brings his hands down fast and hard onto the building, the bottle-lid chimney falls over. Tilly picks up the lids, raises an eyebrow, then smiles at Damien. Damien looks around with his hand on the broken building, looks at the collapsed structure and laughs] […]
Eloise: Can I have some blocks Damien?
Vicki: Did you hear what Sabrina said about there being a monster? Maybe he picked up the house [pause] or maybe …
Sefa: [hands on table edge, leaning up on table] No he like this, wait a minute monster, that not your house Like this wait a minute that’s only my house.
Vicki: That’s only my … yeah he didn’t want …
Sefa: Man say that …
Children’s use of working theories

Children created, drew upon and expressed working theories for a variety of reasons. Theories were employed to explain the phenomena of earthquakes: here focused on the possibility of a monster, perhaps because only a monster is presumed big enough to perform the knocking over actions the children perform on their block buildings (pushing and shaking) on life-sized buildings. In addition, children employed theories to solve problems, such as making a chimney that doesn’t fall apart easily (Tilly used sellotape to fix the bottle lids together). Working theories were also apparent in children’s strategies to solve social issues such as those around the allocation of resources, as in Eloise’s attempt to gain particular resources: ‘whoever is making a chicken home they have to give me one’. This comment could be based on a number of possible theories including theories around sharing resources when you have a number of them (as Izzy does), as well as perhaps a theory that giving just one block is acceptable. Eloise may be developing theories around rules (that rules are required to make the world fairer, or alternatively that people make rules to get other people to do what they want!). In fact Eloise went on to develop rules for the session, creating a sign to tell the children ‘no shaking’; clearly her area of theory development was around rule making. While working theories were expressed on a number of topics besides earthquakes, nevertheless, working theories were always strongly related to the sociocultural context and to children’s problems and desires in this context.

Further, as the activity involved children in creating a representation, it seemed that children’s working theories informed their representation. Tilly looked for materials to create a chimney; Damien made a garage area for a car in his building; Izzy looked for an inhabitant for her building (a chicken): these actions suggest something about the children’s working theories about buildings. It is also possible that it was the materials that inspired children to refer to these working theories: perhaps in seeing the bottle lids, Tilly searched her working theories to decide what the lids might represent. Therefore, working theories may have served a purpose in enabling children to connect more ideas and materials together. Materials may have encouraged children to expand their theories in order to incorporate more materials. Damien’s
activity provides another example: his building and the working theories expressed by him were influenced by the available materials including road tile pieces, blocks, his plastic bear and its bottle-lid car. He connected them with the earthquake concept being discussed, as well as the loud bangs being created as other children knocked their buildings down, telling us ‘now my bear’s going to drive away because he hears an earthquake coming brrrrmm’.

**Implications for the practitioner’s role**

These examples of children’s working theories suggest that working theories are responses to specific situations in which knowledge is connected to support children’s action in those situations. This suggests a pedagogical strategy of developing an awareness of meaningful contexts in which children are motivated to create working theories. For example, after observing the dismay of some children when their building was destroyed, in a later activity session the children were invited to create buildings that weren’t easily broken. Further, in this extract and across the data, it was apparent that children actively expanded their theories to incorporate new ideas or materials. Therefore another pedagogical strategy might involve the provision of a variety of materials, and the encouragement of a number of ideas, to support children to develop their theories.

The sociocultural context, then, seemed important in at least two ways. It provided the impetus for children’s theorising, but also the sociocultural context provided resources that children drew upon and incorporated into their theories. Both the purpose and content of theories seemed to be influenced by the sociocultural context. Sociocultural theory recognises that the social and cultural environment provides resources for thinking and learning, as thinking is achieved through interpersonal processes, in social settings, and through the symbolic resources of the child’s culture (Smith, Cowie & Blades, 2003). This can be seen in the way that children’s ideas were stimulated and formed from aspects of the sociocultural environment, including the ongoing interaction with each other (children picked up ideas from one another), and the material resources (which influenced their representations). Damien’s idea that the ‘bear’s going to drive away because he hears an earthquake coming’ draws upon the material resources which included road tile pieces and led, through association, to Damien inventing a bottle-lid car for the small bear provided, but also draws on the dialogue and actions of his fellow group members, who are talking about earthquakes and banging the blocks on the table. The sociocultural context can be influenced by practitioners, for example, in the choice of materials offered, the organisation of children in groups, or the way ideas are suggested, highlighted or framed in interaction. Therefore sociocultural theory was seen to be a useful basis for pedagogical actions to support children’s working theories. Further reason for developing socioculturally informed pedagogical roles in early childhood in New Zealand is the emphasis of sociocultural theory in the national curriculum document, *Te Whāriki* (MoE, 1996).

Sociocultural theory posits that people can mediate experiences, alongside activities, contexts and tools, yet the extent to which practitioners understand and engage with this mediating role seems to require development and elaboration for many (Anning et al., 2004). Research shows practitioners’ beliefs in Aotearoa New Zealand have been based on developmental constructivist theory (Jordan, 2004), while Fleer and Raban (2006) argue this traditional non-interventionist philosophy is an issue in practitioners developing a more active role in developing cognition. A mediating role can stimulate children’s learning and, while supporting children’s decisions about their learning, can help children’s learning pathways become longer and more complex (Meade, 2000). The rest of this article discusses some possibilities for practitioner mediation in children’s learning that supports their development of working theories. These include indirect mediation, in providing contexts and resources, and direct mediation, through interaction.

**The practitioner’s role in children’s working theories**

Within my study, four aspects were identified as relevant pedagogical actions that supported children’s working theories. The first is that of providing ‘a context for sharing ideas’, suggested by the fact that children’s theorising was supported by the availability of social, material and ideational resources which could be connected to construct theories. The second element, related to this, is the organisation of activity enabling a ‘focus on an open theme’. The final two elements considered relate to specific discourse practices which ‘supported the visibility of ideas’, and that worked to ‘extend the depth and breadth’ of children’s thinking.

**A context for sharing ideas**

The organisation of activity within group work, facilitated by an adult who is interested in thinking and ideas, was seen to create a context for sharing ideas which supported theorising. Practitioner mediation here involved creating a sense of shared activity through a common context and constant commentary on each child’s action and thinking for other children ‘Did you hear what Sabrina said about there being a monster? Maybe he picked up the house?’ A context for sharing ideas also included providing opportunities for children to represent their ideas. Drawing and other expressive forms including model making and block building, provide a means for externalisation of an idea or thought, enabling children to dialogue with and through their representation (Bodrova
Both a shared context and the sharing of ideas lead to high intersubjectivity and participation, which were found to be linked to working theories in Davis and Peters’ (2010) research. Davis and Peters identified creating opportunities for children to share ideas as important, in particular, through setting up scenarios for the exploration of working theories.

Working alongside other children, observing their strategies and listening to their ideas, seemed to be both a prompt and a resource for theorising. The presence of other children is almost guaranteed in the social setting of an early childhood setting, and as sociocultural theory suggests, social interaction provides resources with which knowledge is constructed. While dialogic thinking and intersubjectivity is not a guaranteed automatic consequence of being in a group, my study suggested that it is merely the presence of other children engaged in similar or competing activity that supports and induces theorising, and not a specific quality such as dialogicity.

It is clear from the above extract that children picked up ideas from each other, although there was not necessarily a cumulative progression. Sabrina’s theory that the earthquake could have been caused by ‘a monster shaking in the house’ is reformulated by me as ‘a monster was inside the house shaking it’. A shared understanding is not present at this point, and yet it is perhaps my lack of understanding that prompts Sabrina to articulate a modified theory ‘no it lifted up the house and shook it’. Similarly, Eloise’s ‘no shaking sign’, which comes later in this activity session, is a clear example of theorising prompted by the earthquake activity of the rest of the group which competes with her aim for building play (which appears to involve an elaborate, aesthetically pleasing construction).

Sabrina’s ‘monster’ theory is enthusiastically expanded by Sefa and Izzy, who enjoy physically enacting the possible movements carried out by the monster. Sefa enacts several ideas for ‘the monster was inside the house shaking it’ both with his body (kicking, jumping, backflips) and with his hands (‘that’s me’ he says twisting and turning his hands inside the hollow centre of his block building). Meanwhile Tilly is working on making a chimney, and perhaps it is this that leads Sabrina to suggest that the monster, now interpreted as a jumping monster by Sefa and Izzy, ‘did a jump on the house and pulled off the chimney’. Similarly, Sabrina’s idea of the monster picking up the houses is then reflected in Izzy’s actions when I ask what happens to the house: she picks up the blocks, flies them in the air as well as bangs them on the table.

Focusing on an open theme

This recommendation for practitioners’ pedagogy relates to the way that practitioners can mediate children’s learning by structuring and organising activities for children to best enable the creation and progression of ideas. Other research in education (Alexander, 2000) and in early childhood education (Poimenidou & Christidou, 2010) shows that child-centred and loosely structured activity often fails to ensure coherent progression in knowledge construction. In particular, the many-layered and multiple-themed activities that are likely to occur in open, child-led contexts need to be skilfully orchestrated (Alexander, 2000).

The ideas expressed here for mediation of the learning activity were influenced by complexity theory. From a complexity theory perspective, knowledge is a constantly adapting phenomenon that becomes more expansive, with the emergence of ever-branching possibilities (Davis & Sumara, 2006). While there should be sufficient openness and ambiguity to broaden ideas, the concept of ‘enabling constraints’ (Davis & Sumara, 2006, p. 136) is also useful. Related to ideas around striking an optimal balance between chaos and order, the practitioner needs to impose order through providing constraints, which allow for some diversity of activity (Davis, Sumara & Luce-Kapler, 2000). Constraints provide starting points for a range of possible paths (Davis et al., 2000) and delimiting the topic is thought to increase the diversity of responses.

Thus the concept of ‘focusing on an open theme’ was seen to help children generate ideas and theories. More theorising was noted when activities were focused on a theme, while open organisation with many choices led to very little focus, and also less theorising. For example, my initial question, ‘Would you like to come and do some talking and thinking about earthquakes?’ aimed to be open and not directive, but it was unsuccessful in eliciting children’s theorising or participation. However, a more direct proposal ‘Would you like to build little houses and then make an earthquake come?’ is more successful in generating the children’s interest and their theorising. This pattern recurred throughout the data. Children seemed to have theories and ideas when they were offered a topic to respond to; they were able to make connections among pieces of knowledge, skills and attitudes to form theories, but they required a starting point.

The activities that were most successful in my study in motivating the generation of theory were those that made sense to the children in their context and the problems they had identified themselves. Successful proposals were those based on children’s concerns, for example, a proposal to make houses that can’t break down that was made following observation of Eloise’s and other children’s distress in their buildings breaking as a result of earthquakes. It might be that it is the children’s experience, and their perception of what is important in that experience, that offers the problems, and a sensitive practitioner is responsive and alert to these, and can
formulate them in a way that invites group consideration.

**Supporting the visibility of ideas**

This set of strategies supports the practitioner in making ideas and concepts visible to children. These strategies underline the sociocultural perspective that it is social interaction that supports children to notice and act upon certain details of their actions (Bodrova & Leong, 2007; Inagaki & Hatano, 2002; Rogoff, 2003). To support the visibility of ideas, I drew children’s attention to particular ideas, strategies and properties by describing, repeating, clarifying and questioning. For example, I repeated the children’s words, ‘oh the monster did a jump’ to draw the group’s attention to them.

I also described their action with words, for example describing Sabrina’s ‘do it like this’ with ‘Oh yeah a bit of a shake’, and ‘that made the building fall down’ and commented on features such as ‘a big bang’. In linking language to action, through describing and labelling, the practitioner models new vocabulary and language structures (Bodrova & Leong, 2007) and thus gives children access to concepts and labels to incorporate into their theories.

**Extending depth and breadth**

A final set of strategies supported children to extend the depth and breadth of their thinking, which led to new and more complex theories. It was found that children’s thinking could be extended in several directions: continuing ‘forwards’ by considering the consequences of actions and ideas; probing ‘backwards’ into the reasons for an action or idea; and ‘sideways’ by considering different perspectives and alternative possibilities. Children generally responded when asked to consider the consequences of an idea, as in ‘And what happened to the buildings when the monster jumps?’ As well as specific kinds of questions, the simple strategy of pausing was discovered to lead to extension of ideas and theories.

Considering a phenomenon from different perspectives seemed to broaden ideas and concepts. For example, encouraging children to vary their viewpoint, with ‘What about if the earthquake came from somewhere else?’, generated some new ideas. Sabrina answered ‘a monster’ leading to a whole new line of theorising. Expecting more than one answer generated a rich range of ideas. In this extract, the children were encouraged to keep making suggestions. This was supported by the use of ‘maybe’ (‘Maybe he picked up the house [pause] or maybe ...?’) which emphasises possibility and denies the certainty of any one idea. Uncertainty is important for opening up possibilities (Langer, 1997) and provoking imagination (Carr et al., 2009).

**Conclusion**

This article has drawn upon the findings around the working theory development of one group of children in an early childhood setting, demonstrating that, in this case, working theories were employed to support children’s action in their sociocultural context and that they were formed from children’s knowledge, skills and attitudes, combined with elements from the sociocultural context. With this understanding of children’s working theories, the research explored how I, as practitioner–researcher, developed a socioculturally informed pedagogy for supporting these children.

Perhaps because working theories are required to be useful for the sociocultural context, and the problems and motivations generated by that context, some of the strategies put forward here encourage children to ‘focus in’ on ideas. These are the strategies of ‘focusing on an open theme’ and ‘supporting the visibility of ideas’. However, as working theories were also found to be influenced and expanded by the provision of new elements and ideas, ‘stretching out’ and expanding ideas was also important. This is what the strategies of ‘a context for sharing ideas’ and ‘extending depth and breadth’ achieve.

These ideas, of ‘focusing in’ and ‘stretching out’ synthesise the findings of the study, and are represented here by the image of a yo-yo. The yo-yo image highlights the need for practitioners to support thinking to be able to move off in various, diverse directions, and yet also to maintain a thread of thinking to a central, shared focus.

Figure 1. Putting it all together — A yoyo metaphor

As noted by Edwards and Loveridge (2011), New Zealand early childhood practitioners often hold a common pedagogical approach in line with the curriculum document *Te Whāriki*, while also having personal interpretations of that pedagogy. The suggestions for practice put forward here are merely provisional, forming a working theory of my own which is, like the children’s,
useful to me in my sociocultural context, and yet capable of improvement and modification. It is shared here with an invitation for others to build upon, modify and improve my working theory for their own teaching and learning contexts.

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References


