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Reclaiming childhood play experiences: Enhancing mathematical conceptual knowledge and understandings

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Abstract: This paper is a consequence of a professional development conference that the author was invited to as a keynote speaker. Addressing one of the major conference themes: ‘Play is learning and meaningful’ that involved Cook Islands early childhood teachers from Aotearoa New Zealand and the Cook Islands, the examination of their understandings of play was a key focus (Leaupepe, 2011a). The paper reflects the ways in which teachers have understood play and how they have made relevant connections to the essential learning areas noted in Te Whāriki, New Zealand’s early childhood curriculum framework, The New Zealand Curriculum and the Api’i Tamariki Potiki (ECE) Curriculum Development Draft, the Cook Islands early childhood document (Ministry of Education (MoE), 1996; 2007; 2005). The challenges posed for teachers related to their abilities to recognise the potential and possibilities that exists when children are engaged in play to explore further conceptual knowledge and understandings within these curriculum areas. Concentrating on the mathematics strand within these documents, the paper presents aspects of discussions held by teachers and delves into the tensions that arise when teachers’ expectations of meeting play-related requirements are conflicting. Added to this dilemma is the call for teachers to be adept with the necessary subject-content knowledge that supports children’s further investigations of mathematical concepts. What is highlighted in this paper is the need for teachers to revisit what was termed as ‘neglected knowledge’ (Leaupepe, 2010a) concerning the notions of play, while giving equal attention to the necessity for teachers to engage in ongoing critical dialogue and reflection. The paper concludes with the challenge for teachers to contemplate the re-examining and re-positioning of children’s play to being at the heart of curriculum planning and decisions, to considering what this might mean for teacher practice.

Keywords: early childhood education, curriculum, mathematics and play.

Salutation

The following excerpt has been taken from a keynote address that I had delivered to Cook Islands early childhood teachers, centre/school administrators, members of government agencies within the Cook Islands, teacher aides, families and supporters within the Early Childhood Education (ECE) sector both within the Cook Islands and within Aotearoa New Zealand. It provides the context from which this paper originates.
“E akarainei toku mata, kite au tuaivi? E rauka ainei te tauturu iaku i reira. No ko ia lehova ra te tauturu iaku, ko tei anga it e au rangi e te enua” [Salamo CXXI:1-2].

“I look up to the mountains and where does my help come from? My help comes from the Lord God Almighty, maker of heaven and earth” (Psalm 121: 1-2).

I recognize and acknowledge that in everything I have and do is because my strength, my help, comes from the Lord God Almighty, Jesus Christ Himself. He has given me the ability to do what I do. I understand that as Cook Islands people, the importance of this acknowledgement demonstrates the significance that spirituality has in the lives of our people.

Kia orana kotou katoatoa i roto i te aroa atupaka o te Atua. What a special privilege this is for me to be here today. The island of my family. What connects me to this place? I always like to start with sharing about my family because they give me their blessings to do what I love doing – sharing, talking, learning, laughing and more learning.

My name is Manutai Toru Daniel Leaupepe. I have for the first time, deliberately included my maiden name so that you may be able to make links to my roots, my ancestors, my family line. I am the daughter of Tangi Metua Daniel who is in part, responsible for the person that you see standing before you. I am the grand-daughter of Tarapi and Katiea Daniela and have been blessed with Tahitian, Kiribati and Cook Islands heritage. I am the wife of Aukuso Leaupepe who is Samoan, and we have 3 beautiful daughters and 6 handsome sons. The connections of my family are important because it indicates to others who I am, and where I come from and creates for me a sense of purpose and assurance, a place where I can say - “I belong”.

The opportunity to address the conference participants came through a invitation and so I’d like to take this opportunity in thanking the Taokotai’anga o te au Punanga Reo Kuki Airani o Akarana Association. Firstly; for the honour of inviting me as a keynote speaker and secondly; to be part of such a wonderful occasion. Meitaki atupaka for the privilege to be able to speak about something that is topical and current. I think that the theme for today’s session is timely and I hope that you are encouraged, challenged and even disturbed in some way or another as I share some insights in relation to the term ‘play’ and the ways in which play has been perceived, influenced and practiced, hence the reason for such a title “Play is learning and meaningful: Revitalising neglected knowledge – challenges, assumptions and responsibilities” (Leaupepe, 2010a; 2011a).

**Introduction**

Play in early childhood education (ECE) within Aotearoa New Zealand continues to be the driving force for curriculum planning decisions, and predominantly features in the educational programmes offered to young children (Hedges, 2003; Leaupepe, 2010b). The national early childhood curriculum framework, Te Whāriki (MoE, 1996) recognizes the contributions play provides to the holistic development of the child, and accentuates the need for early childhood teachers to create spaces and environments where children’s play is valued as meaningful learning. The acceptance of play within ECE settings appear to have been unchallenged and unchallenged with reference to its relevance to the teaching and learning of young children (Ailwood, 2003; Leaupepe, 2011a). Since its early developments within the kindergarten movement, Frobel’s idea of children playing within natural environments as free-spirited beings have been influential to the kinds of practices evident within ECE settings (Leaupepe, 2013; May, 2001). We have seen shifts in pedagogical paradigms that now challenge early childhood teachers to reconceptualise play in relation to its purpose and nature (Hill, 2006; Leaupepe, 2011b).

I think it is timely that we interrogate the notion of play because the very idea is what justifies the existence of educational institutions, sports associations, and professionals like myself.
Furthermore, our visions of play are very much connected to our image of the child, or the so-called ‘universal child,’ and the essence of childhood (Burrows, 2000; Leaupepe, 2013) and are coupled with historical, political, social, and cultural concerns. In response to such concerns, many scholars have now turned their attention to the ways in which the idea of the universal child has been challenged by seeking a deeper understanding through the sociocultural lens (Fleer, 2003; Carr, 2001; Duhn, 2006; Rogoff, 2003). The importance of viewing children from a sociocultural lens takes into consideration the ways in which children are socially constructed and where cultural influences are prevalent (Duhn & Craw, 2010). To understand these important social constructions within diverse cultures, context becomes a crucial element that should not be ignored when exploring the often multiple, and contradictory theorizing of play (Dockett & Fleer, 1999; Leaupepe, 2011b).

**Narrative reflection**

When I think about the word ‘play,’ numerous ideas come to mind. Play has meant different things to different people across different cultural, historical, and social spheres and equally important across time. My personal childhood play memories are fond moments of lots of laughter groups of children gathered together eager to take on the challenges handed out to them. I can recall moments where things got risky and dangerous, and then in collaboration with others and through the exchanging of ideas, coming up with a solution after figuring things out, our experiences turning into an epic adventure. I remember vividly what play had meant for me as a child. The friends, the competitions, playing bull-rush against/with the boys and being really good at it, climbing trees, jumping into water holes down at the local river, jumping off the walking bridge into the river and more laughter. My childhood play memories had occurred within a small rural town, where everyone knew you, where walking the streets with friends was fine, and where you felt safe to do so. I could be who ever I wanted to be when I played and with no adult involvement, we (that is, children) were in control. They were truly moments of child innocence.

My involvement within the ECE sector began in the early 1990s with my two very energetic sons aged 3 and 4 years as a parent helper. I was impressed with the ways in which the teachers had taken a keen interest in my boys’ wellbeing that I found myself spending lots of time at the centre. When they had moved on to primary, a private centre had been established within the school’s premises and to which my younger children would eventually attend. Again, my involvement as a teacher aide at that centre had strengthened my interest within the sector. My 15 years working in private, community-based, and state settings before entering the teacher education scene was years of personal growth as a parent and professional growth as a teacher. As a practitioner, I often heard comments by parents/adults about their concern for their child who appeared to ‘play all day’ and ‘didn’t really do much learning.’ These types of comments were particularly prevalent amongst Pacific Island families. As a teacher I understood the need to be able to articulate and justify what I did with children, and this was not always convincing, as little was understood about how Pacific people viewed play (Leaupepe, 2010b).

Driven by my Western theorizing and understandings my approach to such concerns could have easily been deemed ‘culturally insensitive’. My own personal childhood play memories and experiences were fun-filled moments of adventure, risk-taking, and were always on a social level involving some aspect of competition. To some extent, I could not fully relate to the concerns of my Pacific parents and families, as our lived experiences with reference to play differed. It is from such experiences, I knew without a shadow of doubt if I was going to engage in any form of research, it would have something to do with play and it would need to involve Pacific people. Initially, my idea was to explore how Pacific parents viewed play. However, after moving into teacher education this original idea became rather challenging, as time and workload commitments were overwhelming. My attention was quickly turned to our Pasifika student
teachers and the indirect influence I would continue to have with young children and their families. This made sense as I was teaching on a course about play that I had been involved in the development and delivery of the content, materials and resources.

**Play and mathematics**

Historically early childhood education has a long tradition of play-based curricula. The plethora of literature from the past and the present, from national and international research about the benefits of play, and the associations made to children’s learning, are numerous. Through play children learn to communicate, express their feelings, and develop important social networks to construct the necessary knowledge and skills required of them (Wood, 2009). Play provides a valuable social context, where interaction with more knowledgeable or experienced others can be promoted. This is the basis for scaffolding (Bruner, 1986), or guided participation (Rogoff, 2003), where the social interaction as well as the play focus helps make sense and create meanings within a particular context. Play-related research has documented the importance of play in relation to young children’s holistic development (Van Hoorn, Nourot, Scales & Alward, 2003; Bruce, 2001; Dockett & Fleer, 1999; Isenberg & Quisenberry, 2002; Saracho & Spodek, 2003; Sutton-Smith, 1997). Children engage in many forms of play that assist in their understandings of their social and cultural worlds. This provides opportunities for children to expand their awareness of how they understand and make sense of themselves in a constantly changing world. Play has been described as enjoyable, pleasurable, free from external rules, and intrinsically motivated (Aitwood, 2003; Perry, 1998). Through play, children are able to enhance their socialisation skills as they negotiate and problem solve with each other (Dockett & Fleer, 1999; Isenberg & Quiensberry, 2002). Young children’s play can be incredibly complex as children engage in various themes that involve different content and varying levels of interactions.

In contrast, mathematics is often regarded as a formal academic subject found within the compulsory education curricula. Mathematical experiences flourish in children’s play. Within ECE settings some areas of play have been particularly linked with mathematical learning, especially block play, sand play, water play and dramatic play, however all forms of play have the potential for deepening conceptual knowledge and understandings of mathematical thinking.

**The role of the teacher**

The role of the teacher in promoting learning of mathematical concept development becomes crucial. Children are much more likely to engage in play and to develop complex play in an environment where they know that making mistakes is tolerated, where their efforts (regardless of teacher driven outcomes) are respected and encouraged, and where they interact in meaningful ways with people who are important to them. Personal respect is also a key element of such learning environments, where individuals (children and adults) each have the right to share their own understandings and to be heard. Young children are aware of, and curious about, differences and similarities. They bring to the early childhood environment, their own life experiences, including their questions and uncertainties. Teachers need to be able to validate and draw from these experiences. In some contexts, there is a sense that children’s play is best left uninterrupted by adults, whose role is to observe but not interact. There is no doubt that observation of children’s play is an important part of the teacher’s role. However, more complex play is likely to develop when adults have an active role. This does not mean that adults have to become players alongside children. Rather, as Edwards, Gandini and Forman (1998) propose, they need to adopt the role of provocateur. That is, they are not only to observe and assess the understandings of young children’s ideas of mathematical thinking, but also generate experiences and situations that challenge these. This can be further explored through asking questions, introducing elements of surprise, requiring children to explain their position to others and
working with children to consider logical consequences of the positions they adopt. Asking “what if?” question is a great way to start these sorts of conversations.

**Links to curriculum documents**

In the following section links to curriculum documents make explicit reference to the mathematics strand. For the purpose of this paper, I will only draw from Te Whariki and The New Zealand Curriculum.

**Te Whariki links to Mathematics** *(MoE, 1996)*

<table>
<thead>
<tr>
<th>Links with essential skills: Numeracy</th>
<th>Links with essential learning areas: Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Well-being:</strong> children develop competence in mathematical concepts and enjoy using them in daily life.</td>
<td><strong>Well-being:</strong> exploring mathematical concepts encourages creativity, perseverance, and self-confidence.</td>
</tr>
<tr>
<td><strong>Belonging:</strong> children learn to use numbers in relation to family members, children in a group, and ordering the environment in patterns and relationships.</td>
<td><strong>Belonging:</strong> mathematical concepts are used in practical family and social context, such as remembering telephone numbers, street numbers, and birth dates.</td>
</tr>
<tr>
<td><strong>Contribution:</strong> children learn to use number to monitor fair division of resources and equitable sharing of effort towards a common goal.</td>
<td><strong>Contribution:</strong> children develop mathematical problem-solving strategies in, for instance, sharing and dividing resources, turn taking, and estimating times.</td>
</tr>
<tr>
<td><strong>Communication:</strong> children have fun with numbers and begin to understand and respond to information presented in mathematical ways.</td>
<td><strong>Communication:</strong> development of mathematical vocabulary and concepts helps children communicate complex ideas such as weight, shape, and volume.</td>
</tr>
<tr>
<td><strong>Exploration:</strong> in exploring their world, children find reasons to calculate and estimate with increasing accuracy and to use measuring instruments and mathematical concepts.</td>
<td><strong>Exploration:</strong> children develop and use mathematical concepts when they collect, organise, compare, and interpret different objects and materials.</td>
</tr>
</tbody>
</table>

**The New Zealand Curriculum Mathematics Standards for years 1-8** *(MoE, 2009)*

*After one year at school:* students will be achieving at early level 1 in the mathematics and statistics learning area of the New Zealand Curriculum

**Number and Algebra** – In contexts that require them to solve problems or model situations, students will be able to:
- Apply counting-all strategies;
- Continue sequential patterns and number patterns based on ones

**Geometry and Measurement** – In contexts that require them to solve problems or model situations, students will be able to:
- Compare the lengths, areas, volumes or capacities, and weights of objects directly;
• Sort objects and shapes by a single feature and describe the feature, using everyday language;
• Represent reflections and translations by creating patterns;
• Describe personal locations and give directions, using everyday language.

Statistics – In contexts that require them to solve problems or model situations, students will be able to:
• Investigate questions by using the statistical enquiry cycle (with support), gathering, displaying, and/or counting category data.

Challenges and responsibilities: What did teachers say?

According to Geist (2001) “Children are mathematicians from the day they are born” (p. 12). An important strategy for teaching mathematics for teachers to consider is to “add language to children’s play in order for them to begin to contextualise these concepts in an way that is meaningful to them” (Babbington, 2003, p. 5). Teachers are called to ensure that the experiences children engage in encourage and inspire further learning of mathematical thinking. Teachers are called to ensure that children are provided with sufficient time and materials/resources to try out things, consider estimations and have fun with learning about mathematics. Play provides the context in which these opportunities for learning can occur and where children are able to explore, manipulate mathematical ideas within their own interests. With the support of teachers who are confident in their abilities and knowledgeable with subject content specifics within mathematics the possibilities are endless.

Discussions with teachers at the Taokotai’anga o te au Punanga Reo Kuki Airani o Akarana Conference in 2010 provided insight into the ways in which they had understood play, and equally important how they had made links to the essential learning areas – curriculum areas. Addressing one of the major conference themes: ‘Play is learning and meaningful’ that involved Cook Islands early childhood teachers from Aotearoa New Zealand and the Cook Islands, they were able to identify for themselves the ways in which they could further learning within the mathematics strand. I had presented them with a picture in which they were to identify possible links to mathematics [see Figure 1].

The following responses demonstrate where most teachers are at with reference to their subject content knowledge within mathematics. I had asked them to study the picture and followed with the question: - What links can you make to mathematics? Here is what they had to say.

Figure 1: Is a picture of two boys playing with the kitchenette set while the young girl is sitting on the chair observing.
“Children are learning about colours, shapes, numbers. They are learning how to get along with each other and I think they would be involved in some form of counting, you know, like how much ingredients they might need for their cooking, cause it looks like they are cooking”

“They are definitely cooking something, but leaving the poor girl out of their play. Some pouring and measuring, making sure that everything is all accounted for”

“Colours, numbers, shapes”

“Numbers, lots of numbers, different shapes, sizes”

Challenging teachers to think deeply about possible learning that could be occurring within the picture above required further prompting on my part. To think about mathematical concept development meant that teachers had to revisit what I had deemed ‘neglected knowledge’ (Leaupepe, 2011b). Teachers are at risk of falling into taken-for-granted practices that leaves little room for reflection and that can result in practices that go uncontested (Leaupepe, 2009). The ability to move from simple to complex thinking that stimulates an excitement for learning about mathematics can be modelled through teachers. Encouraging a language that develops rich mathematical engagement can be improved when teachers themselves are using and extending language for young children. Making relevant links to the curriculum areas can be furthered when teachers are confident in their abilities to recognize the potential that exists for learning through young children’s play.

To consider including the possibilities of measurement where the vocabulary of volume, capacity, density, increase, decrease, weight, comparison, estimate, contrast can add to children’s learning had got teachers thinking. To consider including the possibilities of geometry where the vocabulary of manipulating, change, transform, are examples of extending language and mathematical concept development. Another example is related to asking children about what is the same attributes with a set of coloured blocks, that they are not only looking for colour, shape or thickness, but could be extended through including number of sides, symmetry, pointiness or roundness.

To consider including the possibilities of statistics where the vocabulary of more than, less than, categorize are examples of extending language and mathematical concept development. To consider including the possibilities of numbers where different ways are offered to children to count, drawing on their everyday life experiences. For example, on your way to school how many...did you see? What did you use to count? If the use of their fingers while pointing at the same time was a strategy they engaged with, what other strategies could be explored? To consider including the possibilities of algebra, relative positions in repeating sequence can be encouraged by including children themselves in forming characteristics. These are just some examples of possibilities within mathematical experiences. Cultural considerations also need to be explored here as well. For example exploring sequential patterns within tapa, tivaevae, and
siapo. Using cultural song and dance for repeating rhythms all enhance understandings of algebraic thinking.

Conclusion

Play continues to be a notion that can be conflicting and problematic, and that still requires further understanding. The challenge for Pasifika early childhood teachers is the ability to recognise how their own views of play impact on their practice. If personal experiences with the subject of mathematics have not been pleasant as a child within formal schooling, it is unlikely that encouraging such mathematical experiences within ECE would be encouraged, let alone be a priority. It is not about the separation of mathematics and play, but taking on an integrated and holistic approach to young children’s learning. This requires teachers to have the necessary subject content knowledge to be confident in working alongside and with young children within the area of mathematics. If this means having to “revitalise neglected knowledge” (Leaupepe, 2011b, p. 24) to confront the deep-seated assumptions about play, then so be it. The intent to uncover what teachers know and understand about the concept of play from their own childhoods is key to understanding their contemporary professional practice and in addition, how curriculum documents, in this case, with a focus on the mathematical strand are actually implemented.

References:


