FEATURE ARTICLE

Envisioning Curriculum as Six Simultaneities

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This paper uses the discourse of complexity thinking to envision curriculum as six partial and coupled facets that exist simultaneously: curriculum as structure, curriculum as process, curriculum as content, curriculum as teaching, curriculum as learning and curriculum as activity. Such a curriculum is emergent and self-organising. It is emergent in two ways: (1) in its deliberate intention to foster new learning, activities and teaching without knowing or dictating exactly what will emerge, and (2) in the sense that curriculum is an ever-evolving reality that is brought forth in the ongoing interactions of the six coupled facets. A self-organising curriculum enables a teacher to create 'a space for running' and foster 'interactive running in that space' to meaningfully honour both the requirements set by authorities and the interests of children and teachers, rather than a pre-determined curriculum. This model of curriculum was developed and is discussed in the context of early childhood curriculum in Aotearoa New Zealand.

Introduction

Envisioning Curriculum

For more than a century, curriculum scholars produced new working definitions of curriculum, creating a field's definitional largesse. However, definitions do not come from curriculum scholars alone: every pedagogue, parent, pundit, policy maker, and politician has one too. Today's conflicting definitions reflect different vantage points from which curriculum is engaged as well as different philosophies and foci regarding the relationship between schools and society. Moreover, the field is complex and understood in contradictory ways. In other words, the multiplication of curriculum

> definitions is not a problem to be solved, but rather a state of affairs to be acknowledged as inevitable. (Breault & Marshall, 2010, p. 179)

Jackson (1992, in Breautl & Marshall, 2010) explains that new definitions count as efforts to change or refine the traditional understanding of curriculum as a course of study offered by an educational institution. Doll (1993) critiques the traditional understanding of curriculum as curriculum content or a pre-determined "course to be run". This traditional understanding has existed since the late 16th century when Peter Ramus used the word to classify and organise courses in philosophy (Doll, 2008).

This paper develops curriculum theory that challenges traditional notions of curriculum as being linear and pre-determined. We propose that curriculum can be envisioned as six partial and coupled facets that interconnect and exist simultaneously: curriculum as structure, curriculum as process, curriculum as content, curriculum as teaching, curriculum as learning and curriculum as activity. Allowing flow (openness, creativity, interaction and time), these facets can support curriculum to be emergent in two ways: (1) in its deliberate intention to foster **new** learning, activities and teaching without knowing or dictating exactly what will emerge, and (2) in the sense that curriculum is an ever-evolving reality that is brought forth in the ongoing interactions of the six coupled facets.

We develop this theory in the context of a case study which explored the discourse of complexity thinking in early childhood curriculum and practice-based research in Aotearoa New Zealand. This study gave rise to a curriculum vision which is an invention that embodies the author(s) and can be experienced by others (Gough, 2002). It is one of many possible visions in curriculum (e.g., Gough & Doll, 2002). This curriculum vision (1) presents a different view of curriculum, and (2) opens up conversations about complexity thinking, emergence and curriculum within early childhood education as well as across other educational sectors.

Problematising Early childhood Curriculum in Aotearoa New Zealand

Nuttall and Edwards (2007) explain that discourses about curriculum began emerging in the Aotearoa New Zealand early childhood scene only in the early 1990s. They distinguish between programme, curriculum, and curriculum framework, as understood by New Zealand early childhood teachers. Programme refers to "those aspects of children's experience that educators have planned, either in a pre-active or in a re-active way" (p. 4), which is consistent with Kelly's (2009) notion of planned curriculum. Curriculum as "everything that the children experience in the early childhood education setting, whether intended or unintended by the educators" (Nuttall & Edwards, 2007, p. 4) resonates with Kelly's (2009) received curriculum and Eisner's (2002) enacted curriculum. A curriculum framework such as Te Whāriki (Ministry of Education, 1996), the New Zealand early childhood curriculum document, counts as a national text that guides local responses and draws from dominant local educational discourses.

The development of Te Whāriki was inspired by progressive and sociocultural theories and beliefs (Soler & Miller, 2003). It represents an innovative approach which is child-centred and holistic in its approach to child development. Te Whāriki defines

curriculum as "the sum total of the experiences, activities, and events, whether direct or indirect, which occur within an environment designed to foster children's learning and development" (p. 10), which can be interpreted to include both programme and curriculum as described above. Therefore, curriculum is understood to encompass everything that happens at an early childhood centre (Nuttall, 2002; Alvestad, Duncan & Berge, 2009). Such an interpretation can be useful as it prompts teachers to firstly, be mindful that all facets of children's experiences at the centre contribute to learning, and secondly, pay attention and respond appropriately. However, Nuttall (2002) concedes that this interpretation is also problematic in the sense that it is "difficult to operationalize, since it demands attention to every aspect of each child's experience with the early childhood centre environment" (p. 91).

Te Whāriki also recognizes the unique ways individual children learn. It is based on the idea that educators need to recognise children's needs, strengths, interests, choices, and enable children to take responsibility for their own learning (Ministry of Education, 1996). This feature of curriculum is consistent with the nature of an emergent and dynamic curriculum where activities and learning experiences change as they are generated by the interests and needs of the children and teachers in a particular setting (Sheerer, Dettore & Cyphers, 1996). At the same time, Te Whāriki does not provide prescriptions or guidelines on curriculum content, which means that teachers and children can collaboratively co-construct curriculum content. However, this approach to curriculum can give rise to a tension between following children's interest and a teacher's ideas about what curriculum content to teach and how to teach this content (Alvestad et al., 2009). For example, when children in a particular setting show an interest in playing games of chase, the teacher's understandings of play and games influence the games played and how they are played.

Te Whāriki is clear about the role of children as active participants in their own learning. According to Nuttall (2003), the teacher's role is less clearly defined in the document. Nuttall argues that what a teacher understands about curriculum influences how he/she enacts it. This paper draws on Hanin's role as a teacher to present a curriculum vision in the context of early childhood education in New Zealand.

Methodology

Pinar (1995) writes that

> understanding curriculum implies remaking both experience and its discursive representations so that we see the past and present more clearly, and where our seeing might lead us. (p. 866)

The experience we draw from in this curriculum vision is Hanin's PhD research. In this research, she took on the coupled roles of teacher-researcher-curriculum designer over fourteen weeks to enact and design a games-of-chase curriculum at an early childhood centre with three- and four-year old children. "Coupled roles" signals the co-emerging and mutually-influencing nature of the three roles; Hanin's thinking and acting as a

teacher influenced and were influenced by her thinking and acting as a researcher and curriculum designer, and so on.

Hanin chose to focus on games of chase in the early childhood curriculum for two reasons. Firstly, this choice limited the scope of her research exploration to a manageable level since, as described above, early childhood curriculum can be interpreted to encompass everything that happens in an early childhood centre. Secondly, she is passionate about teaching physically active play, and considers playing games as one facet of physically active play that can provide valuable learning experiences for young children (Hussain, 2011b). There is also a lack of research into games of chase in the early childhood curriculum (Hussain, 2011a). A focus on games of chase contributes to research into young children's learning in, through and about movement, and to the debate about the role of teaching curriculum content in the New Zealand early childhood curriculum (Cullen, 2000).

Hanin collected many types of data related to curriculum, including video and audio data, fieldnotes, journal entries, photographs and learning stories (Carr, 2001). She used the data to create on-going stories about children's learning, her teaching, and the activities she and the children engaged in. Initial data emerged during fourteen weeks of interactions with the children at the centre (as teacher) while gathering and analyzing video clips (as researcher with a research assistant to take the videos) and intensive journal writing (as both curriculum developer and researcher). This approach to concurrent data collection, analysis and interpretation incorporated unfolding data and knowledge into the research process (Robson, 1993) and fed on new opportunities as they emerged (Patton, 2002).

Hanin used the data, ongoing analysis and reflections to create teaching, learning and activity stories. These different types of stories are explained later in the views respectively of curriculum as teaching, curriculum as learning and curriculum as activity. These stories are presented in the first person and are represented in separate text boxes to distinguish them from the discussions in the paper.

Complexity thinking and the six simultaneities in curriculum

We now illustrate how complexity thinking can be used to envision curriculum as six simultaneities, each representing a different but interconnected view of curriculum. We explain the features of each simultaneity or view and embed explanations of concepts such as nested systems, emergence and enabling constraints within the views. The paper discusses how this conception of curriculum can be emergent and self-organising.

Complexity Thinking and the Six Simultaneities in Curriculum

Complexity thinking is a discourse or a way of thinking and acting that assumes we live in a complex world (Davis & Sumara, 2006) where inter-connections abound, affecting us visibly and invisibly, as well as directly and indirectly.

Complexity thinking has emerged as a diverse, multi-disciplinary, inter-disciplinary and trans-disciplinary field, drawing upon other fields of knowledge (Davis & Sumara,

2006; Alhadeff-Jones, 2008). The type of complexity, referred to as complicity (Cohen & Stewart, 1994), involves highly complex systems that continually interact and influence each other directly and indirectly and implicates the observer as part of the interactions. Complicity implies entanglement. Furthermore, systems that are complicit co-emerge with each other, i.e., they change together but not necessarily at the same pace.

To use complexity thinking in teaching is to think and act in a manner that has these two important features. The first is to be conscious and make use of the mutually-influencing connections (called couplings) that exist or can exist in our teaching setting. A teacher's consciousness of couplings can be tacit and automatic through experience, and/or may be explicit and deliberate. Couplings can be visible and/or invisible as well as potential and/or actual. The second feature is to focus teacher thinking and actions on expanding possibilities in activities, teaching and learning using ethical, logical and meaningful approaches. This involves the creative process of asking "what other ways can this be framed/created/co-constructed?"

Davis and Sumara (2006) present complexity thinking as an important and suitable attitude for teachers since it can enable teachers to explore how they can expand human possibility in ethical ways. Complexity thinking foregrounds ethical responsibility and reflexivity because teachers have an obligation and responsibility to do no harm and to expand children's potential. There is also an endurance aspect to children's experiences; the memories and learning can contribute to or impede development well beyond the duration of teachers' and children's physical presence at the setting. Hence, teachers need to be attentive to how they are implicated in children's learning as it unfolds.

Complexity thinking prompts teachers to consider phenomena such as learning and development, teaching and learning as simultaneities (Davis & Sumara, 2006). Simultaneities are coupled phenomena or different phenomena that exist together and mutually influence each other. In our curriculum vision, curriculum can be seen as comprising of six simultaneities: curriculum as structure, curriculum as process, curriculum as content, curriculum as teaching, curriculum as learning and curriculum as activity. These six simultaneities represent different and partial views of curriculum, each focusing on one aspect of the complex phenomenon of curriculum.

Curriculum as structure: Nested and complex systems of knowers, knowledge and curriculum

The view of curriculum as structure focuses on conceptualizing and understanding the systems that exist in early childhood education (ECE). The systems identified in this view are the nested systems of knowers, knowledge and curriculum as illustrated in Figure 1. Each nested system is multi-layered where each layer or level is itself a system consisting of similar systems (called agents) that interact with each other continually. At the same time, the patterns that characterize a system at a particular level emerge from the interactions of the agents at the level below and act as constraints. Agents at a particular level share common features or characteristics. One of the features is that they

are capable of learning or transforming themselves through change (Davis, Sumara & Luce-Kaplar, 2008).

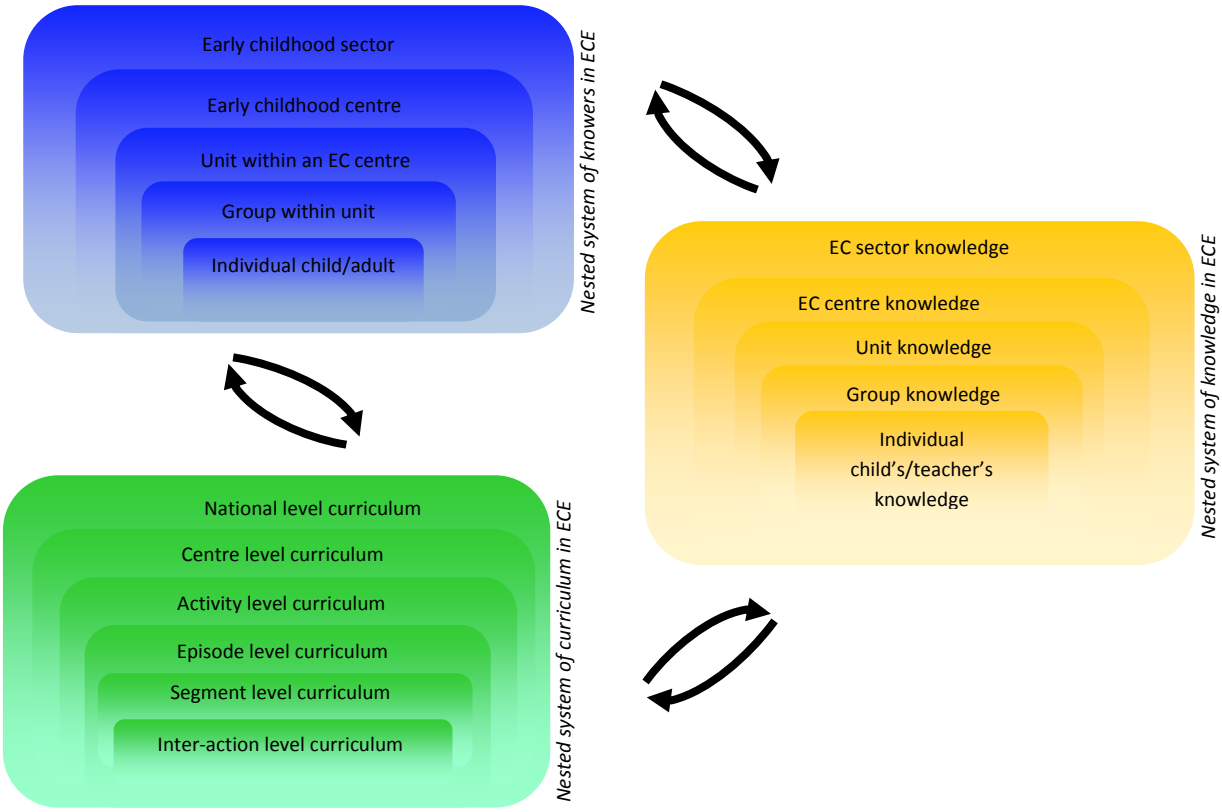

Figure 1: Nested systems of knowers, knowledge and curriculum in ECE

From this perspective, knowers are knowledge-producing systems or physical systems while knowledge refers to ideational systems produced by knowers (Davis & Simmt, 2003). Thus, children and adults count as individual knowers. Each person's knowledge can be tacit and explicit, dynamic and stable, as well as embedded in and embodies acts of knowing (Maturana & Varela, 1998; Wenger, McDermott & Snyder, 2002). For example, in the context of playing games of chase, a group-as-knower refers to a group of children who play together in a particular episode. Group knowledge then refers to the knowledge that arises from the interaction of ideas and actions within the group during that episode. It can also refer to knowledge that is shared or distributed across the players.

The nested system of curriculum focuses on curriculum as a nested system of activities at different levels. This view recognizes that activity is one of the multiple systems in curriculum, and that activity systems continually interact with and mutually influence the systems of knowers and knowledge.

Hussain (2011a) describes the different levels of curriculum in the context of ECE in New Zealand. For example, toileting, meal and sleep routines, mat times, teachers' roles,

teachers' non-contact and the teachers' enactment of the centre's policies all count as examples of activity-level curriculum. These represent patterns of activity that are recognizable by individuals and groups who are part of a centre. The New Zealand ECE context enables activities at any time to be spontaneous, yet enacted within a framework of non-linear development that supports children's learning.

The arrows in Figure 1 prompt us to consider the three systems as simultaneities, or separate systems that are inseparable from each other. This means that while we can consider knowers, knowledge and curriculum separately to create our understandings of each, we also need to be mindful of their coupled and complicit nature, i.e., their interdependence and influence on each other. This relationship resonates with the reciprocal and responsive relationships that are valued and explicit within Te Whāriki which states that "(c)hildren learn through responsive and reciprocal relationship with people, places, and things" (Ministry of Education, 1996, p. 14).

Curriculum as Process: Processes in emergence

The view of curriculum as process focuses on emergence and the processes that give rise to it. Emergence refers to the creation of system-level patterns arising from on-going interactions of the system's agents (Hussain, Conner, Jansen & Mayo, 2010). For example, Figure 2 shows the emergence of a dynamic and beautiful flight pattern (system- or group-level pattern) that arose when thousands of starlings flew together in a somehow orderly manner (interactions of the agents, i.e., birds). Thus, when we speak of emergence, we are simultaneously mindful of two adjacent levels within a nested system as the agents (birds) and system (flock) respond to the changes within. Furthermore, outcomes of emergence can include a new system, new patterns in or properties of a system, or even a new phenomenon.

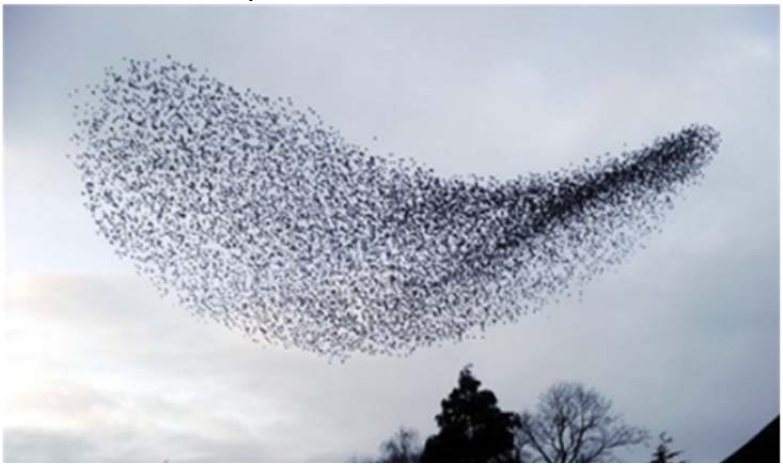

Figure 2: An emergent flight pattern arising from starlings flying together (Coleman, 2011)

The need to be simultaneously mindful of two adjacent levels in emergence resonates with the assertions made by several authors (see Davis & Simmt, 2003; Davis

& Sumara, 2006; Lemke & Sabelli, 2008) that teachers who consciously focus on fostering emergence in curriculum need to identify the systems they are working with, the level(s) of emergence and the level below it/them. Therefore we have identified the systems and the levels of emergence in this study as:

- Emergence of individual and group knowledge in the system of knowledge,
- Emergence at the level of the group in the system of knowers,
- Emergence at the level of activity and episode in the system of curriculum.

Drawing on Maturana and Varela (1998), Davis (2004) and Cohen and Stewart (1994), there are two related change processes that give rise to emergence: drift and self-organization. Both processes involve on-going interactions among agents but drift refers to a process of gradual change while self-organization to a process of spontaneous change.

Drift and self-organization, and hence emergence, occur naturally in many complex systems. A complex system has a natural tendency to drift (Cohen & Stewart, 1994), and this happens because the system is continually interacting with other systems to which it is coupled. The interactions trigger gradual changes to the system's structure and move the system towards a state referred to as the edge of chaos, where the system is simultaneously stable and unstable (Keirsey, 1999). At the edge of chaos, self-organization can unfold when there are sufficient on-going and complex interactions among agents. Self-organization is a bottom-up process in which no agent is directing the change process and the outcome of this spontaneous change process emerges in the on-going interactions of the agents.

The specific mechanisms for drift and self-organisation vary across systems, i.e., they look different in different systems. The rules for these processes can be few and simple; complex interactions do not necessarily mean complex rules. It is often the case in emergence that lower-level agents use simple rules iteratively and/or recursively in their interactions with each other. The iterative and recursive nature of the interactions makes these interactions as a whole complex, prompting Cohen and Stewart (1994) to refer to the interactions as "indescribably complex" (p. 6).

The concepts of drift and self-organization can help the teacher-researcher to keep track of the changes in a system in terms of both its direction(s) and form(s). These concepts were used in this study to describe changes in the following phenomena:

- learning which is viewed as the ongoing transformations in the coupled systems of children-as-knower, their knowledge and the activities they participated in,
- teaching which is viewed as teacher thinking and actions or the coupling of teacher-as-knower and his/her knowledge in the context of his/her activities, and
- activities that unfolded over time in conjunction with the knowers (children and teachers) who participated in the different episodes of these activities and the knowledge they brought to and generated in these activities.

The outcome(s) of emergence can sometimes be surprising and unexpected (Capra, 2003; Maturana & Varela, 1998). The complex, on-going interactions described above can be unpredictable in the sense that they are fluid and give rise to changes in the system, its agents, as well as to the nature and outcomes of the interactions. Amidst such

complex interactions, the outcome(s) of emergence cannot be fully anticipated in advance.

The outcome(s) of emergence can also take multiple and diverse forms. Table 1 summarises three emergent outcomes in the case study and identifies the system(s) and levels at which emergence took place.

Emergent outcome	System & level of system
Big A, Little A, which was a new game the children and Hanin co-created	System of curriculum at activity level
A child's learning in modifying the rules of a game and in teaching two teachers to play the modified game	Systems of knower and knowledge at individual level
Shared knowledge and practices in games of chase	System of knowledge at the level of the group

Table 1: Three emergent outcomes and the system(s) and level of emergence

Emergence can be unintended or brought about (occasioned) by a knower, where a knower can refer to a person, a group, or a centre. Unintended emergence happens without any intention by any knower to create emergence whereas in occasioned emergence, a knower intends for emergence to occur without knowing what the outcome will be. Rather than a pre-determined outcome, there is an intention for the process to enable emergence. Both forms of emergence can occur in curriculum. The examples presented in Table 1 were intended in that a games-of-chase curriculum could give rise to a new game, support children's learning and develop some shared knowledge and practices in games of chase. However, the forms of these emergent outcomes were not pre-determined; these unfolded over the fourteen weeks of playing.

In emergence, the outcomes are not necessarily beneficial to the system or its agents. Therefore, given that complexity thinking foregrounds ethical responsibility and reflexivity as discussed above, occasioning emergence means having the intention to benefit both the system and the agents.

Curriculum as Content: Creating a content framework that is an enabling constraint

The view of curriculum as content relates to creating a content framework that has both structure and flexibility to guide the teacher and children in the decisions they make about curriculum content as they explore the curriculum together. Such a framework is referred to as an enabling constraint, and in an activity such as playing games of chase, where there is joint attention and shared purpose among players, creating a content framework that is an enabling constraint can help foster emergence.

Davis et al. (2008) describe an enabling constraint as

> a structure that is simultaneously constraining and enabling-imposing rules that delimit possibilities and that allow choice at the same time. (p. 194)

With reference to a complex system, an enabling constraint is characterised by sufficient coherence and randomness in the system. Coherence relates to the system's structure and stability, enabling the agents to make sense of the system it is a part of. Randomness refers to influences from inside and outside the system that affect both the system and its agents. The notion of creating an enabling constraint means setting up conditions in a system that can enable the system to respond to randomness in ways that are creative and mutually beneficial to both itself and its agents. The notion of 'sufficient coherence and randomness' carries the connotation of enough of each and a balance of both, giving rise to a system that is both constrained and flexible. Doll (2008) asserts that what counts as sufficient coherence and randomness can only be sensed and cannot be measured. At the same time, specific sources of coherence and randomness are different for different systems (Davis & Sumara, 2006).

The view of curriculum as content shows the framework in Figure 3 that was used for exploring games of chase (for more details of the framework, see Hussain, 2011b). The purposes of this framework were to enable children to play games of chase without too many explicit rules and to prompt the teacher towards actions and strategies that consider both the value of and issues with playing games of chase in an early childhood setting. It also represents a framework that enabled teachers and children to clarify and

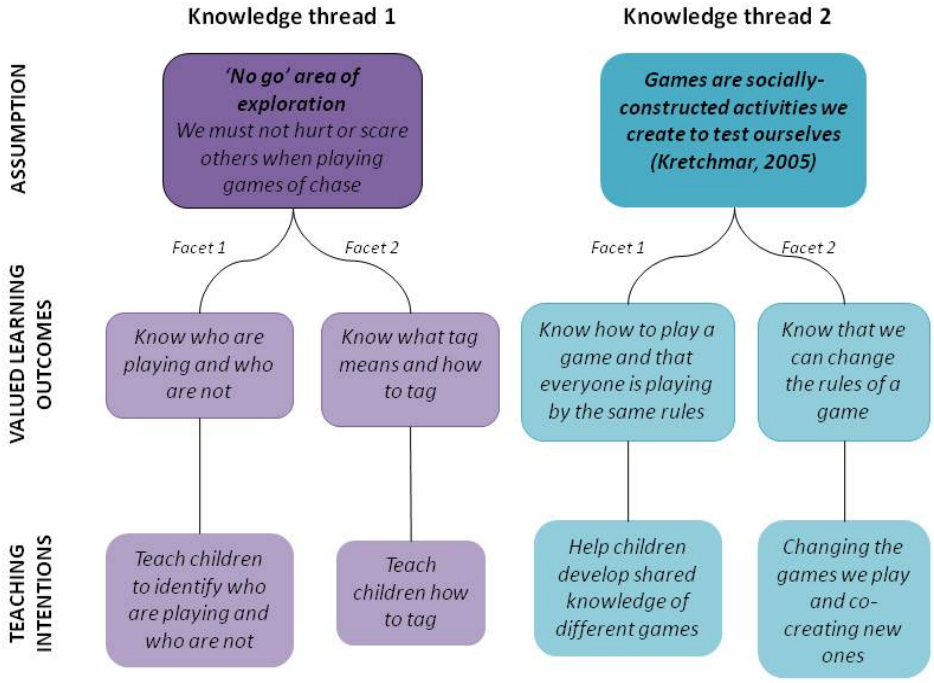

Figure 3: A content framework for playing games of chase in a preschool setting

make sense of the boundaries in the games of chase curriculum, and the choices they can make within these boundaries as they enact this curriculum together. The creation of a

structured and flexible curriculum content framework at the level of an activity is consistent with Oberheumer's (2005) argument about the role of curriculum frameworks to balance the goals of society and the interests and needs of individuals:

> While curriculum frameworks formulate societal goals, goals to pursue for all children, human rights principles foreground the uniqueness of each individual child, and socio-cultural theories the specific contexts and cultures in which children live and learn. The implication, then, is that curricular frameworks should give early childhood centres, pedagogues and children the largest possible freedom to follow individual pathways, while striving towards goals based on agreed societal norms and values. (p. 35)

The framework consists of two inter-related knowledge threads, each with its key assumption, the valued learning outcomes and the teaching intentions.

The focus of knowledge thread 1 was to prompt teachers to create strategies that helped children learn to avoid situations where they unintentionally hurt or scare each other in a game of chase. The focus of knowledge thread 2 was to help children learn the nature of games by introducing children to the idea that games have rules that players agree to abide by, and that players can also agree to change the rules.

However, having an enabling constraint does not necessarily lead to emergence. On-going interactions among agents are another important factor because emergence only unfolds in the midst of these on-going interactions. Thus, occasioning emergence in a system means creating an enabling constraint and encouraging on-going interactions among agents in the system. Furthermore, the presence of both an enabling constraint and interactions does not guarantee that emergence will happen because emergence only occurs when there are sufficient complex interactions at the edge of chaos. In this study, while the curriculum content framework was an enabling constraint that clarified the boundaries and flexibilities of the games of chase curriculum, Hanin found that to occasion the emergence of a new game, children's learning, and some shared knowledge and practices in games of chase, she needed to actively and consciously foster ongoing interactions among players, the knowledge brought to and generated in the games, and the activities they played.

Curriculum as Teaching: Teacher thinking and actions

Although teachers and children are both learners and teachers, the view of curriculum as teaching focuses on the contributions of the teacher's thinking and actions in curriculum. This view foregrounds the teacher-as-knower and how his/her knowledge, in terms of his/her thinking and actions, contributes to and is influenced by the other views of curriculum, i.e., the structures and processes at the centre, the curriculum content and how these are taught, the children's learning, and the activities that unfold at the centre.

In this curriculum vision, teaching is not as much about directing the course of learning and activities as it is about fostering emergence in learning and activities. This means that the teacher takes on the role of collective consciousness (Davis, 2004), paying attention to existing and potential couplings and pointing out to children the

possibilities that can emerge from these couplings. Here, coupling can exist within and across (1) children's, teachers', community and societal interests and values, (2) available resources, (3) ideas and/or (4) events and activities. This view of teaching resonates with Davis' conception of teaching from a complexivist perspective, which involves

> attending to and selecting from among those possibilities that present themselves to her or his awareness. In this sense, teaching is about *minding* – being mindful in, being conscious of, being the consciousness of – the collective. (p. 178, author's italics)

Davis' conception of teaching is reminiscent of Dalli's (2011) conception of early childhood professional practice/teaching in Aotearoa as a curriculum of open possibilities. Dalli identifies three elements that contribute to such a curriculum: relational involvement with children; teamwork and ongoing relational attunement to one's colleagues; and decision-making that considers the multiple layers of thinking, knowledge and understandings from a range of sources. These elements are embodied in a teaching environment which involves working in a teaching team to (1) foster children's learning individually and in groups, (2) manage routines such as toileting, kai (meals) and sleep, (3) create and maintain relationships with children, other teachers and families, and (4) manage regulatory requirements pertaining to premises and facilities, health and safety, administration and curriculum. In the context of the above teaching environment, an individual teacher's thinking and actions are coupled with the discursive practices of and the relationships at the centre.

Since complexity thinking focuses on fostering emergence in ethical and meaningful ways, teacher thinking and actions are based on a focus on value creation (Wenger et al., 2002) and a focus on critical reasoning (Traer, 2009). The former means embracing diversity of interests, motivation, knowledge and participation among teachers and children to create multiple types of value for individuals and groups. The latter involves identifying self-interests and unmasking rationalizations in our decisions and actions (Traer, 2009). Thus, a focus on value creation enables a teacher to generate multiple possibilities and value among teachers and children while a focus on critical reasoning enables him/her to be mindful that those possibilities he/she generates are ethical and meaningful to all involved.

In this study, teacher thinking and actions were made visible by writing teaching stories. These teaching stories drew from the data and enabled Hanin to clarify her teaching experiences and understand her own thinking and actions more critically and deeply (Langley & Senne, 1997) through the lens of complexity thinking. Story 1 is an example of a teaching story which describes the teaching drifts that unfolded as Hanin taught children to identify who were playing

Story 1

Teaching story: Teaching children to identify who were playing

I developed a practice of putting on tag belts to teach children to identify players in an episode. We used tag belts as a visual tool to distinguish players from non-

players, and over time, this practice became a coherent pattern that was recognised by experienced players and spectators. This practice took place before playing and during an episode when I would interrupt our play to help children put on the belts.

I introduced the tag belt on my first day at the centre when 3-year old Rachel requested to play a running game. I did not intend to use tag belts in this episode but did so when Rachel brought up the idea of identifying herself as a player using a name tag; this was something we had done in one of my visits a month earlier. After the game, I reflected on what I had done in a journal entry:

> *"When Rachel reminded us that we needed to have a name tag to play the game, I saw this as an opportunity to introduce the tag belts. Upon reflection, it was not really a good idea to use tag belts with running races because it did interfere with the game; in running races, children can enter and leave the game at any time and it is of no major consequence if we don't really know who's playing and who's not. In a game of chase, however, it is important for children to be able to identify a player and be identified as one because, from experience, I have seen some children chase others who are not actually playing the game, and in the process, frighten them."*

Thus, over time, the practice of putting on tag belts became associated with organized games of chase and not other activities, not even play episodes involving chasing.

On 2 March 2009, eight weeks into my research, four boys and I played *What is the time Mr Jaguar?* which was a variation of the game *What is the time Mr(s) Wolf?* While we were discussing how to play the game, I asked the boys whether they wanted to use tag belts. They voted not to and I took the opportunity to point out who were playing and that we needed to chase only the players. This segment was the first recorded instance of a drift in the practice of putting on tag belts. It appeared to focus on raising children's awareness that they could decide whether or not to put on tag belts based on evaluating how many people were playing and/or knowing who the players were.

Three days later, I recorded another instance of this drift. In this episode, three different children and I decided to play tag after morning tea. One of the girls, Kay, brought up the need to use tag belts and I suggested not using them because there were only four of us and we knew who were playing.

> *Kay: We need the belts … we need the belts for it.*
> *Hanin: We need the belts on to play tag. Do you think that if we only play four of us, we don't need the belts because we know who's playing?*
> *Kay: Yes.*
> *Hanin: Yeah. So we might not need … if only four of us are playing, we don't need tag belts.*
> *Later, we decided to play What is the time, Mr. Wolf? Two other boys, Harry and Edward, noticed us playing.*
> *Harry: What are you playing?*
> *Hanin: We're playing What's the time Mr. Wolf?*
> *Harry: But you need the belt!*

Hanin: Well, there's only a few of us. (unclear) If you want to play …
Harry: I want a belt.
Hanin: Well, if you do then we'll bring the belts out, then there's lots of people playing. Shall I bring the belts out?
Several children: Yeah.
Hanin: Since there are lots of children playing now, ok.

There is no recorded explanation at that time of why I initiated this drift. However, there is evidence to suggest that this shift was coupled with my thinking around the player element in game structure since the shift occurred around the same period I was thinking about tinkering with group size and composition. In my journal entry on 28 February 2009, I wrote:

From the experiences playing games of chase with children over the past several weeks, I am beginning to get a sense that, as a teacher, it may be useful to explore different teaching methodologies in games of chase. I guess the key factors in the teaching methodologies I am looking at is the number and composition of the children who are playing and how it impacts on my role as a teacher, the rules we set up for the game and the game experience itself.

As I see it so far, as a teacher, I can play chase with children

1. *As a teacher-organised activity with a group of up to ten children. This would be the games that involve children entering and leaving the game at different times during a game episode and using the tag belts to identify children playing. The value of such an activity is that it gives all children the opportunity to (1) participate in chase games, (2) play with others they may not normally play with and (3) create interest in such games. I get a sense that my role is to co-ordinate the activity so that children benefit from participating in it, although the benefit they get may vary from child to child, from experience to experience.*
2. *As a focus activity for a small group of children who already normally play among themselves. Such an activity may be seen as an opportunity to generate or extend on interest in playing chase among friends. My role can perhaps be as a non-playing facilitator and observer or as a player.*
3. *As a focus activity for a small group of children who do not normally play (yet) among themselves. This focus activity can serve as a means of helping children learn to interact with each other and maybe eventually become friends.*
4. *As a focus activity for a small group of children who may not normally join in a big group of chase. This may or may not be in conjunction with 2 or 3, and can help that group of children participate in an activity they may be too shy to try out in a big group.*

Looking back, it seems reasonable that playing in small groups would make it easier for children to identify who were playing, especially in groups involving experienced players, older children and/or close friends, thereby making it unnecessary to use tag belts as visual tools. By giving children the opportunity to participate in decision-making about whether or not to wear tag belts, they could eventually learn to do so themselves.

The above teaching story illustrates a view of curriculum as teaching which prompts teachers to consider how their thinking and actions contribute to curriculum and are influenced by other facets of curriculum. It shows how Hanin's initial idea of using tag belts to help children identify who were playing drifted over time, and she recognized a complex relationship between the use of tag belts, the play-based nature of the centre curriculum, the number and composition of the players in the games, and children's learning. Thus, this view of curriculum as teaching enables teachers to reflect on their teaching while being mindful of how the other five facets of curriculum can act as triggers to their thinking and actions.

Curriculum as Learning: Transformations in children's knowing and knowledge

The view of curriculum as learning focuses on the child-as-knower and prompts the teacher to consider how children's learning influences and is influenced by teaching and activities in an emergent curriculum.

Davis and Sumara (2006) conceptualize learning as the on-going transformation of knowers and knowledge. As part of this, content, processes and conditional aspects of appropriating tasks, and changes in activity also constitute learning because the nature and dynamics of activities we engage in as knowers also change as our knowledge changes. Thus, learning is the complicity of knowers, knowledge and activities as they change together but not necessarily at the same pace. This view of learning resonates with the understanding that

> (s)uch transformations are so complex that it is simply wrong to suggest that learning is 'due to' experience or teaching. Rather, learning is 'due to' the evolving structures of an agent-in-context. (Davis et al., 2008, p. 225)

This research examined children's learning at two levels of knowers, i.e., the levels of the group and the individual (see Figure 1) and described the learning in the form of learning stories. In this paper, we share the learning at the level of the individual child in Story 2. The selected child is Kay, who played a major role in the creation of the new game, *Big A, Little A*. Kay was one of two girls who introduced Hanin to the game *Creep Up on Granny*, elements of which were incorporated into *Big A, Little A*. This latter game, in turn, inspired Kay to change the way she played *Creep Up on Granny*.

Kay's learning is described in the following learning story in terms of Kay's interactions with others (including Hanin as the teacher) and her participation in the activities related to games of chase over the fourteen weeks. Some interpretative statements of Kay's learning are embedded at different points in the story and are represented by the italicized texts in the square brackets. These interpretations summarise Hanin's understanding of Kay's learning in terms of the latter's learning in, through and about games of chase.

Story 2

Learning story: Kay's learning

Three-year old Kay attended the centre four full days a week and generally arrived at the centre with Mum, Jacqueline, before 9 am each morning. She willingly participated in and contributed to many of the activities, including running games, tag, *What is the time Mr(s) Wolf?* and storytelling. She also enjoyed playing by herself nearby and watched some of our games before joining in.

When Kay and Jacqueline arrived at the centre on 19 February 2009, they told me that Kay and another girl, Rachel, had learnt to play a new game, *Creep Up on Granny*, at a birthday party. *[Kay's learning to play a game.]* I was not familiar with the game and suggested to Kay to teach it to me later.

After morning tea, I noticed both girls playing the game. They both agreed to teach me how to play and we played two versions because each child had a different version of the game. Kay's version seemed to emphasize the actions of Granny turning around and those behind her stopping and freezing when she did this. *[Kay's learning to teach someone a game.]*

About two weeks later, Kay asked to play *Creep Up on Granny* again, and she wanted me to be Granny. *[Kay's learning to initiate a game episode and contribute to decision about how to play the game.]* I agreed and not long after we started, I began to include a tagging element by turning around to tag children as they got closer to me. This triggered Kay to ask to play tag which was quickly followed by *What is the time Mr(s) Wolf? [Kay learnt to initiate game episodes.]*

Kay did not ask to play *Creep Up on Granny* for the next two weeks. Instead, she continued to play *What is the time, Mr(s) Wolf? [Kay's learning to play a game.]* During this period, I had incorporated some elements of *Creep Up on Granny* into another game, *Big A, Little A.* I introduced this new game and its rules to the children in a storytelling activity. Kay was not present in this storytelling activity but did join us in a different episode of the game a few days later. *[Kay's learning to play a game.]*

On 19 March, a group of children wanted to play a game of chase and we agreed to play after morning tea. Kay approached me after morning tea to initiate playing and when I asked her to invite two other children to join us, she invited Rachel and Edith. *[Kay's learning to initiate a game episode.]* However, the girls could not agree on what to play; Kay wanted to play *Creep Up on Granny* while the other two girls wanted to play *Follow the leader*. In the end, we agreed that Kay would watch the three of us play *Follow the leader*, after which we would play her game. *[Kay's learning to participate in group decision-making and stick to the decision.]*

After playing *Follow the leader*, Rachel and Edith decided to play with Enya, leaving Kay and I as the only two players in *Creep Up on Granny*. *[Kay's learning to*

adapt to an unexpected situation.] When I asked Kay how we would play the game, she gave an explanation which included elements of chasing and tagging that were not present in earlier episodes. *[Kay's learning to modify a game, contribute to decisions about a game and teach someone a game.]*

Kay and I played together until John decided to join us. Later, when I needed to go inside to get ready for the morning's mat time, I asked Kay and John if they wanted to ask another teacher to join them. *[Kay's learning to adapt to an unexpected situation.]* They chose Josie, and Kay taught Josie how to play the game *[Kay's learning to teach someone a game]*. Josie described in a story how she was taught the game:

> *"The first rule Kay told me was that I needed to wear a tag belt. I asked her why and she said that they would know that I was playing if I was wearing one and that they could tag me and not scare me. I agreed that this would be a great idea. After I had put one on, Kay told me that I could stand and watch her and John play a game to see how it worked. This was a great idea as I had never heard of the game "Creep up Granny".*
> *After I had observed their game they came to me and told me "you need to stand by the tree and say I'm awake then you chase us around and catch us". I (also) joined in as one of the people creeping up on Granny, every time being caught when I was chased."*

Four weeks later, on my last day at the centre, Kay asked me to play Big A, Little A with her and Edith. *[Kay's learning to initiate a game episode.]* I agreed but did not want to draw attention to our game because I had already wrapped up the tag belts to give to the centre as a present. So I asked the girls to suggest a different place to play our game and Kay brought us back to the tree where she, John and Josie had played Creep Up on Granny four weeks ago. *[Kay's learning to adapt to an unexpected situation and contribute to decisions about a game.]*

The above learning story describes a child's learning as she interacted with people, places, ideas, activities and things over fourteen weeks. It also shows how her interactions triggered changes in her knowledge in, through and about games of chase. The story illustrates a view of curriculum as learning which foregrounds the child-as-knower and how her knowledge influenced and was influenced by her interactions with the teacher (and others) and the activities she participated in. In this view, learning is an on-going and entangled process of transformative change that embodies both gradual changes (drifts) and spontaneous changes (self-organization) in knowers, knowledge and activities. These changes unfold over time as the systems interact continually with each other.

Curriculum as Activity: Drifts and self-organization in activities

The view of curriculum as activity focuses on the system of activities at the centre and how this system influences and is influenced by teaching and learning. It prompts teachers to consider curriculum as a nested system of activities (Hussain, 2010), and to

organise curriculum in terms of activities This view is consistent with the nested view of curriculum in Figure 1 where early childhood curriculum can exist at six levels: inter-action, segment, episode, activity, centre and national levels. However, this does not mean that teachers neglect views of curriculum as teaching (teacher thinking and actions) and learning (changes in the form and nature of children's thinking and actions); these are and should be visible in terms of how the teachers' and/or children's decisions and actions influence and are influenced by the activities.

In this study, Hanin fostered and analysed emergence at the levels of episodes and activities (see Figure 1). She collected data at the inter-action level which enabled analysis of segments, episodes and activities, and created activity stories which described and explained how episodes and activities, directly and indirectly related to games of chase, unfolded at the centre. Story 3 is an activity story about how the complex and ongoing interactions of knowers (teachers and children) and their knowledge in different activities triggered the creation of the new game, *Big A, Little A*.

Story 3

Activity story: Emergence of Big A, Little A

Over the fourteen weeks, the children and I played three different types of games of chase across thirty-four different episodes. We started with *tag*, followed by *What's the time Mr(s) Wolf?* and finally *Big A, Little A*. When a new game was introduced, we continued to play the game(s) that preceded it. For each game, we started by playing a simple version and then varied the ways we played it. Table 2 describes a simple version of each game of chase and some variations we played. The rules for the simple version represent the patterns in each game, giving the game its coherence. The variations represent randomness introduced into the games arising from decisions to change the rules during play. The rules also highlight the increase in game complexity from *tag* to *What's the time Mr(s) Wolf?* to *Big A, Little A*.

Game	Rules for a simple version of the game	Variations we played
Tag	There are two roles: the chaser and the runners. The chaser runs and tags the runners by touching them.	• We incorporated a new role, that of a caller who called out 'Stop' or 'Go' to which the chaser and runners had to respond by stopping and running respectively. • We tagged in different ways, e.g., by hugging, tickling or pulling off the flag from the runners' tag belts. • We had a designated safe place where a chaser could not tag runners who were in this place. •
What is the time	The wolf sits in the tyre while the pigs call out "What is the time Mr(s) Wolf?"	• Instead of calling out "one o'clock", the wolf called out "Kay time" or

Mr(s) Wolf?	from their house. If the wolf calls out a time like one o'clock, the pigs call out again. If the wolf calls out "Dinner time" or "Lunch time", the pigs run out of their house and the wolf chases them. Pigs can go back to their house to be safe. The wolf chooses the next wolf.	"time to have a shower" or something else that the children considered funny. • We played with families of wolves and families of pigs.
Big A, Little A	We play on the concrete area using two opposite ends of the rubber mat area as 'lines' to mark our positions. The bird stands at one end of the rubber mat while the bugs (all other children) stand at the other end. The bird faces away from the bugs. The bugs creep up towards the bird, repeatedly chanting "Big A, Little A, bouncing B, (Child's name) bird's asleep and he/she can't catch me" When the bird turns around to look at the bugs but does not say anything, all the bugs have to freeze both their movement and singing. When the bird looks away, the bugs start moving and chanting. When the bird turns around to look at the bugs and says, "I'm awake", he/she starts chasing the bugs. The person who is tagged becomes the next bird.	• The bugs chose which bug to be and moved like the bug. Later, a child chose to be an animal instead of a bug and everyone followed suit. • We incorporated the role of the adult and baby birds and bugs. • We played in different playing areas, e.g., on the rubber mat area, the concrete area and the bark area. • Sometimes we played with one bird and at other times we played with two or more birds.

Table 2: Rules and variations for the games of chase we played

I decided to start with tag because I had noticed that the children had a range of experiences in games of chase and so it seemed best to start with a simple game. This would enable the children to experience success in playing the game and begin to learn the nature of games (see Figure 3).

There were times when our game episodes seemed more like play rather than games. In these episodes, the children were more interested in role-playing the characters and stories than playing the game itself. I allowed and encouraged the play to occur, knowing that preschool children often transform games into play by focusing on their interpretations and the imaginary aspects of the games, and using the rules as a general guiding framework (Corsaro & Evaldsson, 1998).

As we played over time, there were ongoing interactions in the systems of knowers, activities and knowledge. These are illustrated in Figure 4 as interactions among people (children, myself and other teachers represented by the red boxes), the activities (represented by the filled and unfilled oval shapes), and the ideas,

knowledge and skills we brought to and learnt from the activities (represented by the unframed texts). For example, we started by first playing running games (RG), starting with a simple version and then changing the rules to make the game more complex. These running games enabled the children to run in a group safely without crashing into each other, and learn to run within some specified boundaries. Then we played different versions of tag, again starting with a simple version and varying it. By playing tag, children were also learning new skills such as dodging, fleeing, chasing and tagging. Some children also brought the concept of a safe place into the game by incorporating in the rules a place where they could not be tagged by the chaser. Figure 4 also shows that as the games moved from running games (RG) to tag to *What is the time Mr(s) Wolf?* (WITTMW) to *Big A, Little A* (BALA), there were more knowledge, skills and ideas that were embodied and embedded in the games.

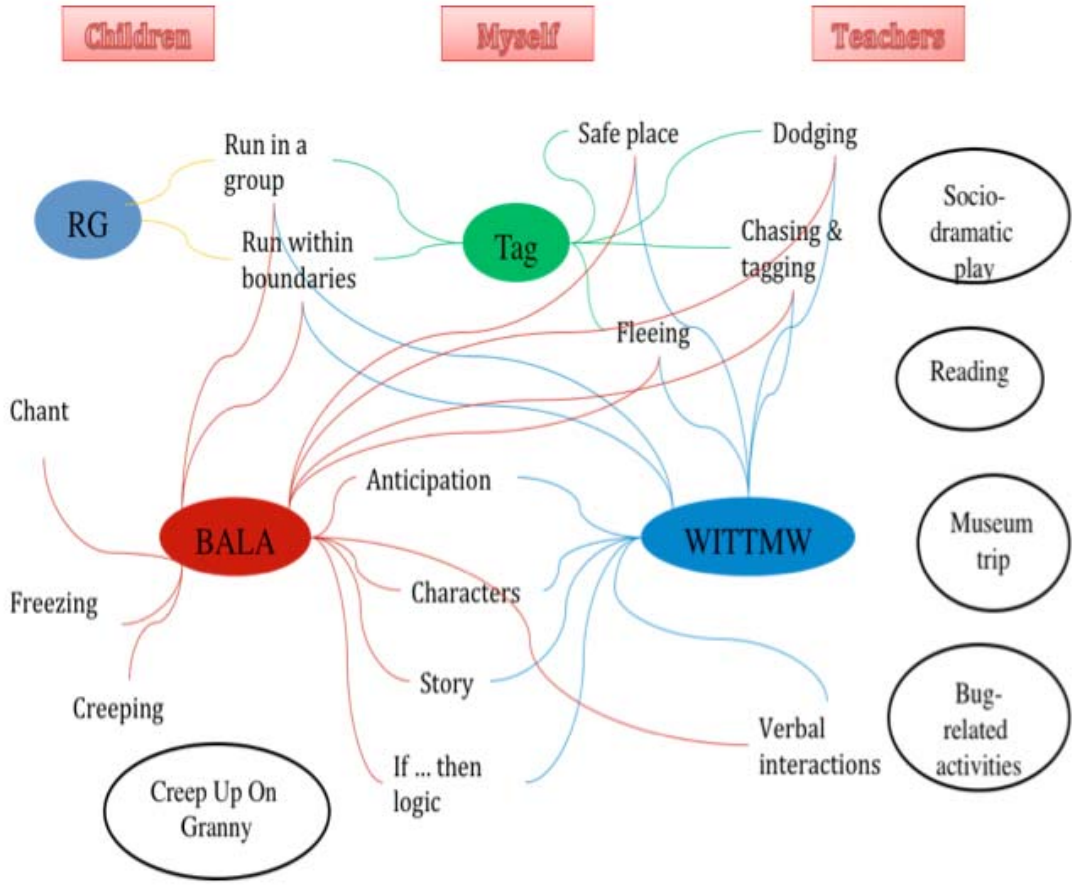

Figure 4: Interactions of knowers, knowledge and activities that gave rise to Big A, Little A

There were also other interests and activities that contributed to the decisions to play *What is the time Mr(s) Wolf?* and *Big A, Little A*. For example,

- children's interests in sociodramatic play and stories gave rise to the inclusion of characters and stories in these two games,

- children's interests in bugs prompted teachers to organise a trip to the museum to study bugs and to set up other activities related to bugs, which in turn, prompted me to include bugs in the story and character aspects of the game *Big A, Little A*,
- the game *Creep up on Granny*, which was introduced by two girls (see Learning story: Kay's learning) triggered the inclusion of creeping and freezing in *Big A, Little A*.

The introduction of new ideas, skills, knowledge, interests and activities meant that there were on-going drifts in the games which eventually gave rise to the emergence of the new game, *Big A, Little A*. Thus, the emergence of this new game did not arise from the influence of any one person or idea. Instead, it emerged over time when different people recognised at different points in time what was interesting in our interactions with each other and responded to it. It was this coupled process of recognising and responding over time led us to this new game.

The above activity story illustrates a view of curriculum as activity which prompts teachers to recognise the role of activities in curriculum, and how activities can interact with teaching and learning in the emergence of something new. This view foregrounds the system of activity while simultaneously making visible the relevant knower-knowledge systems that influence and are influenced by the changes in the activities.

Summary and Discussions

This paper presents a curriculum vision which conceptualises curriculum as consisting of six coupled views or simultaneities: curriculum as structure, curriculum as process, curriculum as content, curriculum as teaching, curriculum as learning and curriculum as activities. Each simultaneity focuses on presenting a different and incomplete view of curriculum and Table 3 summarises the focus of each simultaneity.

Simultaneity	**Its focus is on ...**
Curriculum as structure	Conceptualising and understanding the systems that exist in the setting, i.e., nested systems of knowers, knowledge and curriculum/activity.
Curriculum as process	Understanding emergence and the processes of drifts and self-organisation that give rise to it.
Curriculum as content	Creating an enabling constraint to enable teachers and children to make decisions about curriculum content.
Curriculum as teaching	Foregrounding the teacher-as-knower and how his/her thinking and actions contribute to curriculum and are influenced by other aspects of curriculum.
Curriculum as learning	Foregrounding the child(ren)-as-knower and how his/her/their interactions with others and participation in activities trigger changes in knowledge and activities.
Curriculum as activity	Generating and enacting the activities at the centre and explaining

	how these influence and are influenced by teaching and learning.

Table 3: Summarising the focus of the six simultaneities

Curriculum as Emergent

In this curriculum vision, curriculum is emergent in two ways. Firstly, it deliberately uses an intention to foster emergence, i.e., to occasion new activities, learning and teaching without pre-determining or knowing what the new activities, learning and/or teaching outcomes will be. This intention to foster something new is explicit and visible in this curriculum vision; hence it is a curriculum for emergence.

This vision also shares with other understandings of emergent curriculum the focus on responding to and building on children's interests (e.g., Buell & Sutton, 2006; Lewin-Benham, 2006; Rinaldi, 2006; Shearer et al., 1996; Jones & Nimmo, 1994). It recognizes a range of sources that can contribute to a dynamic and emergent curriculum (Jones & Nimmo, 1994), including the role of both the children's and teacher's interests, goals and needs in informing and shaping curriculum (Alati, 2005). For example, in the activity story, while Hanin was interested in playing games of chase with the children, she was mindful to follow and incorporate children's interests into the games they played. This included children's interests in socio-dramatic play, stories, bugs as well as other games. At the same time, the exploration of games of chase with children wove content and skill learning with interest-based learning (Cullen, 2000).

Secondly, curriculum is emergent in the sense that it is an ever-evolving reality that is brought forth in the ongoing interactions of the six simultaneities. This emergent nature of curriculum arises because the coupled nature of the simultaneities means that they cannot be separated from each other, and each continually interacts with and mutually influences the others. Embodied in these interacting simultaneities are the interactions of knowers, knowledge and activities at multiple levels. This conception of curriculum as an ever-evolving reality is consistent with Nuttall's (2003) view of curriculum as "a process of constant co-construction, framed by its social-cultural context" (p. 180-181).

Since the teacher is implicated in this reality, he/she needs to be attentive to his/her part in it as it unfolds, and make visible the bases of and justifications for his/her decisions and actions. In this study, we have made visible some of the bases of Hanin's curriculum decision-making including:

- articulating the intention to benefit the agents and systems in the systems of knowers, knowledge and activities,
- justifying the curriculum content framework in terms of its assumptions, valued learning outcomes and teaching intentions,
- using value creation and critical reasoning in her thinking and actions.

Curriculum as Self-organising

The view of curriculum as six simultaneities also resonates with Doll's (1993) notion of a self-organising curriculum. Doll argues that a self-organising curriculum should

embody diversity, multiple perspectives and explorations. In this curriculum vision, diversity takes the form of the different ways we played the games of chase, multiple perspectives are visible in the six views of curriculum, and explorations are a feature of the games of chase we played both in its curriculum content framework and its enactment.

In order for a curriculum to be self-organising, there needs to be scope for drifts in systems of knowers, knowledge and activities so that emergence can be fostered in each of the six simultaneities. Fostering emergence in traditional curriculum structures which are linear and pre-determined is problematic when specific content needs to be covered within set timeframes, thus reducing the scope for drift and emergence.

Doll (1993) emphasizes the self-organising curriculum's focus on currere, where currere refers to the process of running and the path that is created in the running. This focus is in contrast to the traditional understanding of curriculum as a pre-determined set course to be run. He writes:

> Curriculum will be viewed not as a set, a priori 'course to be run', but as a passage of personal transformation. This change of focus and subject will place more emphasis on the runner running and on the patterns emerging on the course run, although neither the runners nor the course can be dichotomously split and transformation will emerge from the activity itself, not be set prior to the activity. (p. 4)

Doll's notion of curriculum suggests that the 'course to be run' can be viewed as the planned curriculum (Kelly, 2009), i.e., what is made explicit in curriculum documents, and currere as the received curriculum or the reality of children's lived experiences (Kelly, 2009). While we agree that currere is important, we suggest that the planned curriculum is equally important, especially in the current climate of teacher accountability and politicization of curriculum (Kelly, 2009).

However, curriculum that is focused on occasioning emergence does not envisage the planned curriculum as a set course, but more as a 'space for running'. The teacher can create this space by transforming the dictated 'course to be run' so that there is both structure and flexibility. Such curriculum allows for flow (openness to possibility, creativity, interaction and time). It follows then that currere can be viewed as the 'running in that space' which involves runners (teachers and children) interacting with each other and with knowledge that is brought forth in the running. It is from this 'interactive running' that individual and collective patterns in and of running emerge. Thus, this curriculum vision honours both public and personal agendas in an emergent curriculum (Collins & Clarke, 2008), i.e., it responds to curriculum requirements imposed by authorities at the same time that it is "responsive to and respectful of individual and collective student learning agendas" (p. 1003). An understanding of curriculum as simultaneities provides the opportunity for teachers and curriculum developers to co-create learning situations which empower both learners and institutions in ways that were not possible with more linear and pre-determined approaches to curriculum development.

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