## HANDBOOK OF DIGITAL LITERACIES IN EARLY CHILDHOOD

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#### Part 3: Young children's digital literacy practices in early education settings

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### YOUNG CHILDREN'S DIGITAL PLAY IN EARLY CHILDHOOD SETTINGS: CURRICULUM, PEDAGOGY AND TEACHERS' KNOWLEDGE

#### Abstract

Using the concept of converged play, we examine what changes might be needed to ameliorate the differences between children's digital play and use of digital technologies in their homes, and provision in early childhood settings. Drawing on our research project "New play pedagogies for teaching and learning in the early years" (Australian Research Council DP150102040), we link the concept of converged play to a web-mapping tool (Edwards, 2015) to illustrate how the participating teachers developed their understanding of children's interests and funds of knowledge within digital play. We examine the implications of the research for teachers' knowledge, pedagogical approaches and curriculum planning.

#### Introduction

Research indicates that children's digital play practices seem to be in advance of teachers' adaptation of curriculum and pedagogical approaches to incorporate digital technologies, digital media and popular culture, and the potential for learning that these materials generate (Aubrey and Dahl, 2015; Edwards, 2016; Howard et al, 2012). This gap has been identified as an international concern (European Commission, 2012): children's digital activities are not always well-understood by teachers, and may not be valued in ways that will advance children's competences, or connect with curriculum content. This chapter explores some of the reasons for this gap, and proposes new play pedagogies as a way forward. The first section presents the research literature that identifies the gap between children's converged play and

curriculum and pedagogy in ECE. The second section sets out the conceptual framework, combining contemporary iterations of socio-cultural theories, with theories of children's interests, funds of knowledge, and converged play. The third section illustrates how teachers in the "New Play Pedagogies" project shifted their understanding of digital technologies, digital media and popular-culture, and how children's interests and practices could be integrated into the early childhood curriculum. The conclusion considers three key questions that are of international significance in ECE regarding new play pedagogies, curriculum and teachers' knowledge.

#### 1. Children's digital play – contemporary perspectives

The role of digital literacy within the broader literacies field incorporates children's multi-modal home and school practices, including the ways in which popular culture texts and artefacts are embedded in the literacy and play lives of children and their families. Marsh (2017) describes the connections that flow between children's literacy and play practices with digital technologies, media and popular culture, ranging from clothing, household goods and food to mobile phones and accessories, internet sites and virtual worlds. This "transmedia ecology" (Black, Alexander, Korobkova, 2017) provides contexts for children's multi-modal literacy practices before "formal" teaching of school-based literacy. Children's interests are embedded in new technologies, as reflected in their uptake, potential for learning, social engagement and the development of imaginative play.

Contemporary play repertoires dissolve barriers of space, place and time because of their potential for multi-modal forms of communication and interaction. Abrams, Rowsell and Marchant (2017) present the concept of "playscapes" to explain the global and local flows and pathways that circulate around and within children's interactions with digital and non-digital tools and resources. The concept of playscapes reflects the interweaving of human, material, semiotic and discursive practices, and attempts to theorize how boundaries are blurred between children's digital technology use, digital media participation, popular culture and play practices. Contemporary perspectives on play highlight that children do not consistently play within the frame of one digital game, but create their own ways of playing across multiple contexts, typically simultaneously (Wohlwend, Buchholz, Medina, 2017). For example, in an ethnographic study of four 3-year-old children's digital game play, Huh describes their "multi-formed game play" as they made up their own digital games through their experiences with digital games (2017: 192), and their everyday interests. The children could tactically use and navigate real and virtual spaces for their play; they bent and broke the game rules, and even recreated the game scenes for their play (2017: 192). They demonstrated similar forms of spontaneity, agency and control that characterize traditional/analogue play, by incorporating the digital world for their own purposes. Huh reports that the children use game content as tools to play with and create new forms of play by mixing their game play and other play in real life (2017: 192).

Innovations, such as the iPad, enable children's participation in the transmedia ecology. Research indicates that children respond to the range of digital options available to them through these technologies and adapt them for their own play repertoires (Flewitt, Messer & Kucirkova, 2015; Papadakis, Kalogiannalis, & Zaranis, 2018). Consistent with the concepts of transmedia ecologies and playscapes,

children's play practices evolve through new modes of engagement and interaction, with expanded choice and flexibility, which also reflect their interests and enquiries, and their participation in diverse cultural activities and practices. Modes have sociocultural and social semiotic purposes because they link social interactions, cognitive content, meaning-making, children's interests and identities. These play practices sustain the cognitive flexibility that is fundamental to learning and creativity, based on children combining and re-mixing their home-based funds of knowledge across time, space and contexts.

In view of the rapid developments in children's use of digital technologies and engagement with digital media and popular-culture, what factors might explain the differences between home and ECE settings, specifically their uptake by early childhood teachers? From a socio-cultural perspective, the "everyday" concepts that children reveal in their play may become the foundation for the scientific concepts in the subject disciplines or areas of learning within curriculum documents. However, as Fleer (2016) has shown, traditional/non-digital play does not consistently provide the contexts for the shift from everyday to scientific concepts, and there are ongoing tensions in pedagogical approaches that aim to mix or balance adult-led and childinitiated activities. Chesworth (2016) argues that these approaches are not mutually exclusive, because both require attention to planning and organizing the curriculum, pedagogical interactions with children, and assessment of learning processes and outcomes. Nevertheless, child-initiated and adult-led play have been difficult to reconcile, and are proving problematic in the context of children's digital and popular-culture experiences (Burnett and Merchant, 2013). The latter problem reflects ongoing debates about the appropriateness of digital technologies and popular culture

in children's lives where the promotion of traditional play may be a defence against the assumed negative effects of digital play.

In addition, teachers may be bound by the demands of national legislated curriculum frameworks in which valued learning outcomes become the focus for their teaching, observations and assessments. Moreover, these outcomes may be narrowed to "basic skills" in, for example Literacy and Numeracy, to prioritize children's readiness for school (Ang, 2014), and may reflect the instrumental effects of ECE policy frameworks (Wood, 2015). In contrast, the fluidity and complexity of children's digital play practices do not fit neatly within such frameworks. These factors confirm that attention to different characteristics of settings and contexts is crucial to understanding the differences in children's home and pre-school practices. Taking a socio-ecological perspective on this problem, Edwards, Henderson, Gron, Scott and Mirkhil (2017) tracked children's technology use in their homes and in an early childhood centre. They argued that elements of the centre associated with technology use suggested that activity, time, place and role influenced how and why technologies (2017:6).

In summary, problems with integrating children's digital play in ECE settings cannot be explained as mismatch of teachers' knowledge, theories and practices, or as the instrumental effects of ECE policies. Nor is it simply a matter of providing professional development to change teachers' knowledge as the basis for changing their practices regarding digital technologies, media and popular-culture (Beauchamp et al, 2015). We propose that the task for teachers is to go beyond the traditional ECE dichotomies of everyday/scientific concepts, informal/formal approaches, child/adult-

initiated activities and digital/non-digital play, to understand how new pedagogical possibilities can be created that combine children's converged play and curriculum knowledge, in ways that integrate home, family and preschool-school practices.

Drawing on Jenkins (2006), convergence initially explained the disappearing boundary between technologies, interactive media and popular culture. Subsequent research expanded this concept to describe how digital technology, media and popular-culture also interfaced with young children's traditional forms of play (Edwards, 2013a,b) (such as construction, sand and water, role play, outdoor play, with non-digital resources). Converged play occurs when children use a technology and/or are inspired by popular culture characters to participate in traditional play activities, for example by watching a Bob the Builder DVD and then digging and building in the sand pit with trucks. Converged play also occurs when traditional activities are enacted using technologies, such as using craft, painting and drawing apps on a tablet or computer. In spite of children's widening play repertoires, there are ongoing challenges for teachers, specifically to recognize and support children's converged forms of play (Edwards, 2013a,b). In our research, we approach this challenge by re-positioning teachers' use of digital technology, digital media and popular-culture as a field-specific issue related to defining and understanding children's converged play, and the wider educational implications. The following section sets out the conceptual framework for the research, and the development of web-mapping (Edwards, 2013) as a tool and process for enabling teachers to captalize on changes in children's popular culture and digital play experiences at home to foster valued learning through the ECE curriculum.

#### 2. The conceptual framework for "New Play Pedagogies"

Multiliteracies conceive pedagogy as comprising: (a) teaching practices that connect with children's life worlds; and (b) learning outcomes that foster the capacity to generate learner-designed products and multi-modal forms of communication (Kalantzis and Cope, 2012). We propose that the new pedagogies required for multiliteracies are equally relevant for children's play practices, where thinking, acting, learning and playing in transmedia ecologies are seamless processes. Three concepts are fundamental to theorising children's learning in our project: funds of knowledge, children's interests, and converged play all have implications for incorporating new ways of understanding learning, pedagogy and curriculum. Funds of knowledge refer to the understandings, interests and expertise that children develop, and contribute to, as participants in their families and communities (Moll, Amanti, Neff, & Gonzalez, 1992). Funds of knowledge incorporate everyday practices, such as shopping and cooking that may engage children in emergent concepts of mathematics and literacy, and provide contextual understanding of the situated meaning of those practices and concepts. Children's funds of knowledge are understood to motivate learning, and are connected to their interests as they participate in diverse communities and practices.

Children's interests are significant from a pedagogical perspective, because they can inform curriculum planning (Hedges, 2014). However, there is some debate as to whether children's interests are momentary and idiosyncratic and are, therefore, difficult for teachers to interpret, let alone map into areas of learning and curriculum goals (Hedges, 2014; Lovatt and Hedges, 2015). Hedges and Cooper (2015: 9) have argued that interpreting interests as simply "activities" can mask understanding of

what the activity represents in terms of children's funds of knowledge and deeper enquiries. Their research linked children's interests with understanding and negotiating multiple and shared identities as members of peer groups, families and wider communities and cultures. Children's interests are expressed through free play activities, social interactions, and their choices of play materials and themes. This has implications for how teachers might develop responsive pedagogical approaches that incorporate children's play-based interests, including popular-culture and digital play. However, research also shows that teachers are not always confident about recognizing and responding to children's digital and popular-culture interests (Fleer, 2016), or identifying the potential for learning. Therefore, the concept of convergence is relevant in addressing how teachers might understand the breadth of children's interests and the modes through which these are expressed. In addition, convergence offers explanations for how ECE curriculum policies and frameworks are lagging behind children's digital play.

Research indicates that convergence is a common experience for children because they no longer experience technologies, interactive media and popular-culture as separate from traditional play, in home and educational settings. O'Mara and Laidlaw (2011) first illustrated converged play in their work describing two pre-school aged children playing tea parties. The children had a tea party app on their iPad to which they invited their "real" dolls and teddy bears. Other examples of convergence are "toys to life" figurines, such as Disney Infinity and Lego Dimensions, which come to life on screen when placed on a portal connected to a gaming device. Kervin and Verenikina (2018) argue that convergence has reached a point of saturation in the lives of many young children, such that it is no longer possible to observe whether or

not digital play activities influence traditional play or vice-versa. Moreover, children's converged play integrates cultural agency and competence in extending their play repertoires.

Although converged play is an established concept, less evident is the extent to which it is incorporated into the early childhood curriculum, and whether teachers' pedagogical approaches foster convergence to support children's interests and valued learning. Converged play arguably provides multiple opportunities for children to develop and deepen their interests, but these practices may not be mirrored in ECE settings, for a number of reasons. Teachers may notice children's interests as emergent themes, knowledge and ideas. However, as Hedges and Cooper (2015) noted, there is less evidence about how children's interests can be recognized, extended and engaged with in ways that connect with the goals of the curriculum. Teachers may thus fall back on methods that are more likely to ensure curriculum delivery, such as direct instruction and adult-guided play, or rely on traditional forms of play. The dislocation between child-initiated and adult-led activities remains a significant issue in international ECE curriculum frameworks, many of which specify learning goals or outcomes, and direct play towards achieving those goals (Hedges, Peterson and Wajskop, 2018; Wood, 2015), particularly in Literacy, Numeracy/Mathematics and Science/knowledge of the world. Where digital technologies are referenced in ECE frameworks it is generally not in relation to children's play, thus further entrenching the separation between the digital as a fund of knowledge for children, and play as a means of achieving curriculum goals. Furthermore, ECE curriculum frameworks may not acknowledge children's home and family digital practices, nor encourage those practices as valued learning experiences

or outcomes. This is in spite of the potential of converged play to combine content (what children learn) with learning-relevant processes and dispositions such as agency, self-regulation, metacognition, problem-solving, creativity and imagination, and with children's funds of knowledge. However, the place of play in general, and converged play in particular, remains problematic, such that teaching practices and learning outcomes for children may not foster the links between multiliteracies and pedagogy as proposed by Kalantzis and Cope (2012). The following section describes the research project, and how we addressed these problems and challenges by using web-mapping to explore new play pedagogies in ECE.

#### 3. Using web-mapping – teachers' perspectives

This section focuses on the development of pedagogical practices with qualified teachers in early childhood centres in Victoria, Australia, involving children aged 3-5 years, and their families. The research project "New play pedagogies for teaching and learning in the early years" reflects socio-cultural orientations, building on Vygotskian principles of learning and pedagogy. Multi-modality and multi-literacies frame children's communicative practices and meaning-making in different contexts (Kalantzis and Cope, 2012), and involve different forms of representation. The concept of funds of knowledge (Moll et al, 1992) is used to understand children's converged play practices, and the extent to which teachers use their knowledge of children's converged play in curriculum planning. Tool-mediated activity (Kravstov and Kravstova, 2009) proposes that people use tools to achieve particular objects of activity within specific contexts.

Web-mapping was initially developed by Edwards (2013b) to examine children's home-based use of digital technologies, digital media and popular culture interests. In the "New Play Pedagogies" research we extended the web-mapping tool to help teachers engage with the concept of converged play using a visual web (Fig 1). The object of activity for teachers was planning for children's converged play using web-mapping as a pedagogical tool. Key to web-mapping as a process is the idea that converged play is uniquely experienced by children as relational within their families and communities, even though their interests may represent globalized forms of popular-culture and digital technology. The concept of playscapes (Abrams et al., 2017) similarly highlights that the "global" is re-contextualized by children within their play to represent their local experiences.



Figure 1. Web-mapping as a representation of the convergence of traditional and digital play

The aim of the project was to investigate the pedagogies enacted by 17 sessional kindergarten teachers who used the web-mapping tool with 66 children aged 3-5 years. Web-mapping operates as a pedagogical observation and planning tool because teachers can "map" children's converged play by shading those sectors of the web that integrate traditional play (e.g., construction, role play), with digital technology, digital media and popular-culture interests. By reflecting on both the shaded and unshaded sectors of the web, teachers can plan for converged play within the curriculum. Web-mapping thus incorporates thinking about children's funds of knowledge, their observed interests and the concept of converged play, to help teachers integrate digital technologies, interactive media and popular-culture into the curriculum. Critically, the web-map allows for teachers' planning to promote what is perceived as "valued" learning (either by teachers or according to curriculum frameworks), and to consider new play pedagogies.

Our aim in this chapter is present examples from the empirical data in order to raise questions about how teachers can make sense of children's converged play in relation to the curriculum. Some teachers in the study did include reference to *Belonging*, *being and becoming: The early years learning framework for Australia* (EYLF) (Australian Government, 2009). However, the questions we raise from this project are of relevance for curriculum and pedagogy across international contexts.

#### Web-mapping, funds of knowledge and curriculum

In the initial interviews it was clear that the participating teachers were positively motivated with respect to children's use of digital technologies; many added,

however, that they struggled to incorporate digital play into the curriculum. In followup interviews at the end of the web-mapping intervention, the teachers made a variety of comments in response to a question about whether web-mapping prompted changes in practices or pedagogical approaches. Analysis of these responses indicates that the process of web-mapping raised the consciousness of the teachers about the extent of children's home interests and expertise in technologies, digital media, and popular culture; generally, the teachers had been unaware of these interests and the expertise held by children. Because teachers were unable to plan using these interests in the past, they had potentially overlooked significant funds of knowledge that children brought to the kindergarten. Web-mapping therefore alerted teachers to children's interests in popular culture and digital devices, enabling them to acknowledge and potentially respond to these interests. They also reported how they noticed learningrelevant dispositions such as perseverance, motivation, engagement, creating and solving problems, and creativity. One teacher, Josie, articulated how web-mapping had supported her planning for converged play, based on her recognition of digital media and popular culture in young children's lives, and capitalizing on children's home interests. She also described how the web-mapping process had enabled her to notice and respond to a child who had been diagnosed with autistic spectrum disorder (ASD).

In her post-video interview transcript, Josie describes how the child would not use the play dough, and they were concerned about the development of his fine motor skills. Building on his interests in Lego and *Star Wars*, Josie printed and laminated some *Star Wars* figures, mounted these on sticks, then placed them with the play dough. She describes how the child

would make things like the Millennium Falcon...then he would take Chewbacca and Han Solo...and he would use the characters...to drive the spaceship. He would make Storm Troopers, other things out of playdough.

As a result of this intervention, the children who joined him in this activity "were having these lovely conversations about who does what, who flies where, and where the storm troopers go". In addition to developing his social interaction and conversations skills, the boy went on to draw pictures about his interests, and write his name, motivated by Josie allowing him to watch some YouTube film clips of Lego and *Star Wars*. Thus, although his interests did not seem to be directly related to the curriculum goals and outcomes, Josie's responsive pedagogical approaches ensured some flexibility alongside intentional framing of his learning and development. Building on this child's interests enabled Josie to facilitate his social participation in a group, and changed her ideas of how to use digital technology to support the needs of children with ASD. The project data also revealed teachers' recognition of the value of children's interests in popular culture (e.g. *Star Wars*, *Monster Trucks*, *Frozen*) as a source of curriculum planning, mainly in the area of social interaction and development, as well as planning individualized learning activities.

In her post-video interview, Kate described collaborative use of the iPad to extend children's play interests in building a swamp with crocodiles. They've been building a swamp with the crocodiles and we got the iPad out this week and said, 'Let's have a look at some crocodiles in the water' and they tell me what they want me to search up. In the Google bar I say to them, 'What would you like me to look up?' and they say, 'Crocodiles in the swamp' so I'm saying, 'Crocodiles–' and I'm typing it in, the letters, and they're watching the words come up. Then hitting 'go' and they're telling me where the images are. They're showing me with the finger how to swipe. They're talking me through it.

This search activity was subsequently repeated because the children noticed snakes in the pictures, and wanted to add these to their swamp. For Kate, the links to curriculum content included language, reading, social interaction and using Google searching as part of their play. Kate commented that the pedagogies may be changing, but the learning outcomes remain the same:

...you want the kids to have social skills and language skills and you're still teaching them but the way you're teaching them and the knowledge base you're using to form all those skills is really different.

It was evident in our analysis that the web-mapping tool and the resulting web maps, were not used in the same ways by all teachers. For example, some teachers sought to incorporate the EYLF or its outcomes in the web-map as part of their planning. Some teachers altered the web-maps, producing multiple hand-written annotations that included traditional areas of learning and development such as mathematical, social, emotional, physical, and communicative learning; others raised questions about where books, writing, and symbols might be incorporated. One teacher wrote the EYLF learning outcomes on her web-map to show the connections between her plans and ECE curriculum policy. This inclusion of traditional developmental areas on the webmaps may be a strategy to remind teachers of connections between traditional play and technologies, digital media and play inspired by popular-culture. Alternatively, web-maps could have been altered to plan in ways that were familiar to the teachers such as developmental areas, or the EYLF Learning Outcomes. As Kate commented in her post-video interview, "It was good to have the tool. I think I would probably adapt the tool for myself so that it made more sense to me". Some teachers expressed concerns about sticking with traditional play and traditional elements of the curriculum because that is what is known and familiar. This may also reflect wider concerns about digital versus (and possibly displacing) traditional play, rather than seeing the potential of converged play.

Overall, it was evident that the web-map as a tool, and web-mapping as a process, made sense for most of the teachers as a way of raising consciousness (teachers' explicit awareness) and enabling them to understand what actions they might take to link their practices with children's learning outcomes *via converged play*. However, reflection on the findings of the research project suggests three questions of international relevance for ECE curriculum policies, pedagogy and practice:

- 1. What is the content of the curriculum in ECE?
- 2. How might pedagogy and curriculum be theorized to enable the field to engage with children's participation in transmedia ecologies?

3. What would it take for pedagogy and curriculum to respond to these changes?

#### *1.* What is the content of the curriculum in ECE?

We have argued that curriculum and pedagogy in ECE are lagging behind children's converged play, which is problematic in light of contemporary theories of transmedia ecologies and playscapes (Abrams et al, 2017; Black et al, 2017). On the basis of our research findings, we propose that "adding on" or "adding in" digital technologies are an insufficient response to this problem. The challenge for teachers is to understand convergence in relation to the funds of knowledge children bring to the early childhood setting, and how convergence may be pedagogically situated to enhance children's motivation to share and develop their interests, to support learning-relevant dispositions and capabilities, and to learn, use and apply content knowledge.

There are fundamental epistemological questions about the core skills, knowledge and concepts in the ECE curriculum, how these are formulated as progressive curriculum goals, and what pedagogical approaches should be used (Wood and Hedges, 2016). The foundational knowledge for curriculum for ECE had traditionally derived from applied child psychology and child development theory. Even where socio-cultural theories have informed contemporary ECE policy frameworks, there tends to be a developmental orientation to how outcomes are defined and sequenced (Wood, 2015). Internationally, play is seen as developmentally appropriate activity, because children's interests drive provision, rather than substantive disciplinary knowledge. From a developmental perspective, converged play remains problematic for teachers because it is difficult to integrate digital technology, media and popular-culture in

ways that would be considered "developmentally appropriate". Currently there is no developmental framework for understanding children's rapid uptake of digital technologies, and their converged play, alongside the implications across different socio-economic groups and contexts. These phenomena are happening spontaneously and in situated, dynamic contexts, with developmental and educational theories lagging behind. In contrast, the findings from our project suggest that web-mapping addresses this problem by helping teachers to mobilize the concept of convergence in ways that can be utilized within the curriculum to achieve a range of learning goals, and respond to children's interests. However, contemporary perspectives on learning suggest that a shift is needed from privileging what is developmentally *appropriate* to what is developmentally *possible* in transmedia ecologies. This is because new theories of transmedia ecologies and playscapes suggest limitations in continued use of developmental theories as the primary knowledge base for teachers. Traditional developmental theories of play and learning are similarly inadequate for the purposes of understanding the complexities of children's converged play.

A further problem is that policy frameworks in many countries now define, to varying degrees, both curriculum content and pedagogical approaches (Wood and Hedges, 2016; Hedges, Peterson and Wajskop, 2018). As a result, play in many contemporary ECE curricula is framed within defined limits of achieving outcomes, raising standards and improving school readiness, all of which are at odds with play-based learning. A review of research on play in the UK presents consistent evidence that child-initiated, freely-chosen play is losing the battle against adult-led "educational play" that is more directly linked to the learning outcomes in curriculum frameworks (Wood and Chesworth, 2017). Similar concerns have been documented in

international contexts (Breathnach, O'Gorman, & Danby, 2016; Fesseha & Pyle, 2016; Hedges et al., 2018). In light of contemporary directions in the field of new literacies, and in children's digital play, it seems there is a disjuncture between the role of technologies in curriculum frameworks, how technologies provoke learning, and the implications for new play pedagogies. This leads to our second question of what needs to change to address these challenges.

# 2. How might pedagogy and curriculum be theorized to enable the field to engage with children's participation in transmedia ecologies?

As previously noted, research indicates that teachers' practices may be constrained by how they understand children's capabilities and interests, and how these understandings might connect with conceptual learning across curricular areas of learning. There is broad agreement in ECE curriculum frameworks that child-initiated and adult-led play should be integrated to support children's learning and development (Chesworth, 2016). This demands that practitioners draw on pedagogical modes that serve different purposes. Wood (2014) has conceptualized integrated approaches as incorporating three pedagogical modes, each with implications for curriculum planning, enactment, and assessment: (1) teachers respond flexibly to children's self-initiated activities, interests and play; (2) teachers design adult-led activities that are playful and allow for responsive interactions; (3) teachers plan activities that focus on specific learning goals within the curriculum, based on adultled direct instruction. Each of these modes involves flexibility in the intentional/responsive framing of activities and interactions that can support learning in particular ways and directions. How these different modes might be understood in the context of ECE curriculum frameworks, and teachers' knowledge of children's

digital practices, requires further articulation to maximize the potential of converged play for children's learning.

Consistent with Wood's (2014) conceptualisation of integrated pedagogical approaches, teachers can focus on guiding and extending children's learning through their choice of appropriate pedagogical strategies. Our findings have shown that this can be realized when teachers engage with children's interests and funds of knowledge, and how these are expressed in the context of converged play as sources of knowledge that relate to curriculum content. We argue that new play pedagogies hold potential for addressing the dichotomies between everyday/scientific concepts, informal/formal approaches, child/adult-initiated activities and digital/non-digital play. These propositions require fundamental epistemological shifts that would need to be reflected in initial and continuing teacher development programmes, in curriculum frameworks, and in teachers' knowledge and practice. Moreover, critical consideration is needed of what, and whose knowledge is valued within curriculum frameworks. We argue for contemporary theories of learning that align with new play pedagogies of the type fostered by the concept of convergence. This, in turn, raises our third question, related to how such theories might come about.

3. What would it take for pedagogy and curriculum to respond to these changes? This question is particularly pressing in the context of digital technologies, digital media and popular culture, and the implications of new play pedagogies for teachers. Our research contributes to current debates about the implications of converged play for children's learning, as well as new forms of agency, multi-modal communicative competences, and meta-cognition that are evident in new literacies research (Bezemer

and Kress, 2016; Burnett and Merchant, 2013; Robson, 2010). Digital technologies, digital media and popular-culture are situated within new media ecologies that permeate all aspects of children's experiences, thereby provoking new developmental challenges. These challenges have profound implications for practices of curriculum and pedagogy in contemporary ECE. Therefore, we propose that corresponding shifts need to occur in three areas.

Firstly, new play pedagogies can support converged play by enabling teachers to build on children's funds of knowledge and interests in ways that promote multimodal approaches to learning. Web-mapping as tool and process enables teachers to identify children's converged play, and to make pedagogical decisions about how to motivate learning that is related to children's interests and competences, and can be connected to curriculum goals. Such changes can be facilitated when teachers have opportunities to collaboratively imagine new practices, based on exposure to examples of new or unfamiliar practices.

Secondly, we argue that the implications for curriculum require a dynamic focus on learning processes, and on content. In terms of processes, our research project indicates that converged play enables children to develop positive dispositions for learning, such as engagement, persistence, agency, and concentration, alongside the metacognitive skills of inquiry, creativity, creating and solving problems in meaningful contexts. In terms of content, converged play can relate to the disciplinary forms of knowledge within the areas of learning that are represented in national curriculum frameworks for ECE. We argue that a focus on dynamic learning

processes and content enables teachers to orient towards children's everyday lifeworlds in ways that can reduce anxieties about curriculum compliance.

This links to our third point, that curriculum frameworks should incorporate the key concepts associated with those practices, and to represent these as curriculum goals or learning outcomes. We have argued that policy frameworks in ECE continue to rely on child development theories as the knowledge base for teacher education and curriculum construction. However, there is no developmental framework for understanding converged play. In contrast, new theories of transmedia ecologies and playscapes suggest that the knowledge base for teachers needs to move beyond developmental theories of play and learning. This is because children are engaging with multi-modal digital texts, and inventing their own uses for digital media, both of which reflect the complexity and fluidity of converged play for extending children's learning. We argue that this complexity and fluidity require critical consideration of teachers' curriculum planning and new pedagogical approaches to play.

#### Conclusion

We propose that in order to understand converged play in relation to curriculum, researchers need to direct their attention to how teachers can recognize children's funds of knowledge and interests, informed by the connections between learning in the home and in early childhood settings. Researchers also need to identify and describe how such funds of knowledge can be systematically noticed, accepted, and fostered by teachers within the curriculum to support learning. This is an urgent task. Digital design is evolving rapidly, including touch-screen technologies, the Internet of Toys, wearable technologies, augmented reality toys, along with channels such as

YouTube, where children upload their own content and engage large numbers of their peers in co-curated play based on popular-culture interests. Children are *already* engaging with multi-modal digital texts and inventing their own uses for digital media, both of which reflect the complexity and fluidity of their converged play. This, in turn, requires critical consideration of the place of converged play within teachers' curriculum planning and pedagogical approaches. Furthermore, understanding and appreciation is needed of the complexity of children's life worlds, the range of different modes and platforms for their learning, and the material and immaterial culture of children's lives. In making these recommendations, we are not arguing for more top-down, centralized directives for teachers, but for local, grounded, and research-informed approaches that enable teachers to generate changes in their thinking and practice.

Our research does not override ongoing concerns about the over-use or inappropriate uses of digital technologies, such as online safety, child protection, and health. Instead, our focus is on how teachers can be enabled to recognize converged play in order to plan the curriculum, and develop integrated pedagogical approaches. As the playscapes and transmedia ecologies in which children are growing up continue to evolve, so too does the requirement for teachers to connect with children's life worlds, including converged play. There are ongoing debates about what needs to change in early childhood education in terms of integrating theory, policy and practice in order to reflect what engages children, and what they are choosing to engage with in their transmedia ecologies. We argue for new play pedagogies that are responsive to children's interests and funds of knowledge, as evidenced in their multiliteracies

and multimodal play repertoires. Contemporary ways of understanding learning, aligned with new play pedagogies, can help to drive these changes.

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