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Digital Meaning Making: Reggio Emilia-inspired Practice in Swedish Preschools

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Abstract

Young children's everyday lives are increasingly permeated by an array of digital tools that are rapidly changing the forms in which they make meaning. Yet the use of digital media in early childhood education is much disputed, with debates often polarised between strongly negative rejections and unquestioning positive endorsements. Alternative perspectives are necessary in order to recognise the significance of digital media in young children's lives and to develop respectful pedagogies which support meaning making in multiple forms.

This article highlights practice with digital tools in three Stockholm preschools influenced by the Reggio Emilia approach to early childhood education. The settings used the Reggio Emilia concept of 'the hundred languages of children' as a foundation for their use of digital media, resulting in an approach which embraced and embedded digital tools in everyday practice alongside other materials.

The insights from the preschools demonstrate ways in which Sweden is fostering an early childhood pedagogy that critically evaluates the affordances of digital tools whilst considering their limitations and relationships with other materials. In this way, a multimodal approach to young children's digital meaning making is being developed, prompting consideration of the possibilities for similar approaches to digital literacy beyond Sweden and beyond early childhood education.

Keywords

Early Childhood; Digital Literacy; Multimodality; Sweden; Reggio Emilia

Introduction

Digital media are rapidly reshaping young children's everyday experiences and changing the forms in which they make meaning. Responses to the ubiquity of digital media in early childhood often range from moral panics and fearful rejections to unquestioned positive endorsements (Plowman, Stephen, & McPake, 2010). However, calls for broadened perspectives on 'literacy' emphasise the need to closely attend to the place of digital media in education (The New London Group, 1996; Lankshear & Knobel, 2003; Parry, Burnett, & Merchant, 2016). A multimodal perspective offers particular insights through recognition that meaning making occurs in many modes beyond language (such as image, sound, gesture) and focuses attention on the *potentials* and *constraints* of digital tools (see Flewitt, 2011; Jewitt, 2006; Kress, 2005; Kress & Cowan, 2017). This paper explores connections between a multimodal perspective on young children's digital meaning making and the practice of Swedish preschools inspired by Reggio Emilia in Northern Italy.

In early childhood education, Reggio Emilia has become synonymous with creative, child-centred pedagogy. Informed particularly by the work of Loris Malaguzzi, the infant-toddler centres and preschools of Reggio Emilia are founded upon an emphasis on the rights and communicative potentials of all children (Malaguzzi, 1993; Malaguzzi & Cagliari, 2016). Central to this approach is the concept of 'the hundred languages of children', a theory which gives value to the many forms of expression children use to make meaning, beyond those of speech and writing (Edwards, Gandini, & Forman,

1998). In Reggio Emilia the concept of the 'hundred languages' is made evident particularly through 'atelier' studio spaces in schools equipped with a range of creative materials and tools for exploration, supported by specialist 'atelierista' artist-educators (Vecchi, 2010). Whilst the 'hundred languages' have typically been considered in terms of natural materials (clay, wire, paint etc.), consideration of 'digital languages' has been given increasing focus in Reggio Emilia in recent years (Scuola Comunale Dell'Infanzia Diana, 2012). Underpinned by a strong pedagogy of meaning making in multiple forms, the Reggio Emilia approach therefore offers insights into the possible role of digital media in early childhood education.

Despite originating in its own particular Italian context, interest in Reggio Emilia has been widespread within early childhood education, including 'The Stockholm Project' (Dahlberg, Moss, & Pence, 1999) which explored links between the Reggio Emilia approach and Swedish early childhood education. This connection has been further sustained through development of the Stockholm Reggio Emilia Institute, an organisation which supports Reggio-inspired preschool practice in Sweden through lectures, courses, workshops and publications. As such, Swedish preschools offer an insight into early childhood education influenced by Reggio Emilia within their own particular international social and cultural context.

The concept of developing children's 'digital competencies' is receiving increasing attention in Swedish preschool education (Skolverket, 2016) and Swedish education policy more broadly (Regeringskansliet / Government Offices of Sweden, 2017). Informed by consultations with researchers, teachers and teacher-educators, forthcoming changes to the Swedish national curriculum seek to place greater emphasis on aspects such as critical media literacy, digital texts, programming and creative problem-solving with digital technology. In the preschool curriculum, recommendations

state that young children should be supported to develop digital skills including understanding the role of media in society and developing responsible use of digital tools (Skolverket, 2016). The proposed changes illustrate that digital literacy is a topic high on the agenda of the Swedish Government, and suggests a willingness of policy-makers to engage with researchers and practitioners in formulating their approach.

Whilst debate continues regarding the role of digital technologies in early childhood education, Swedish preschools demonstrate a context in which the use of digital tools are receiving growing attention, with many settings using Reggio Emilia as a reference point for meaningfully incorporating the digital into their existing pedagogies.

Stockholm Research Visit

The use of digital tools in Reggio-inspired Swedish preschools was explored through a ten-day research visit to Stockholm funded by the DigiLitEY Project, a COST-funded action investigating the digital literacy and multimodal practices of young children. The combined aims of the research visit were:

1) To explore **theoretical** perspectives on children's digital technology use through consideration of multimodality and the Reggio Emilia approach.
2) To consider the **methodological** possibilities of collaborative research-practice partnerships surrounding digital technologies through time spent at the Stockholm Reggio Emilia Institute and its network of preschools.
3) To examine the **practical** ways in which digital technologies are used in Reggio-inspired classrooms in Stockholm, and the pedagogy behind their use.

In combination, the research visit's aims sought to explore a distinctive approach to digital meaning making, shedding light on pedagogies which embody multimodal perspectives.

The aims were explored through visits to a preschool teacher training session organised by the Stockholm Reggio Emilia Institute. Led by educators with expertise in digital technologies and creativity, the training took place in the Institute's atelier studio space over a series of twilight sessions. These sessions included seminars for educators, practical exploration of different digital tools, experiences combining digital and non-digital forms, and support developing visual communication relating to pedagogical documentation. In addition to the training session, visits were made to three preschools identified through discussions with the Stockholm Reggio Emilia Institute and the University of Stockholm. The preschools provided education for children aged one to six across three of Stockholm's city districts. The training session and school visits were chosen in order to demonstrate settings using digital technologies within a Reggio Emilia inspired ethos, offering insights into what is considered 'good practice' in this context. Whilst this is a subjective and contested term, and whilst the three settings offer just a small snapshot of complex and consistently developing educational environments, they support the identification of several themes relating to use of digital technologies in early childhood education inspired by Reggio Emilia within the Swedish context.

In the teacher training session and in each of the three preschools, a tour of the setting was given by educators. This prompted the educators to reflect on their values and rationale in the context of specific examples of early years practice. In each setting, photographs were taken which exemplified typical use of digital tools and written notes were made to record observations and discussions with the educators. These notes

were elaborated in a more extended 'research journal' format immediately after the visits and form the basis of the vignettes below.

The vignettes offer narrative accounts of the visits, combining description, reflection and photographs of spaces and materials. Vignettes are chosen as a device for recounting the experience of the preschool visits as they combine reflections on practice, context and researcher interpretation. As a device typically used in case study research (see Stake, 2000), vignettes support analysis as they require a restructuring of thought (Menary, 2007). In this way, the vignettes seek to recall and evoke the experiences of the research visits whilst interweaving interpretation in relation to the research aims.

Digital meaning-making: vignettes

Whilst the settings were in many ways different, the visits offered rich insights into how digital meaning making was supported within the Swedish system and influenced by core concepts from Reggio Emilia. The following vignettes illustrate five examples of the innovative pedagogical approach to digital meaning making that was encountered.

1. Exploring digital and non-digital combinations: Teacher training in the atelier

During my visit to the Stockholm Reggio Emilia Institute, the atelier had been set up with a range of materials carefully chosen to invite exploration of the body and movement (an example project for the purposes of the workshop). Throughout the space, which was richly stocked with a range of materials, digital tools were presented alongside 'traditional' forms throughout. For example, a selection of malleable materials (clay, wire etc.) were positioned close to several wooden artists' mannequins, located near a mounted iPad set up with motion-capture software (see Figure 1.1).

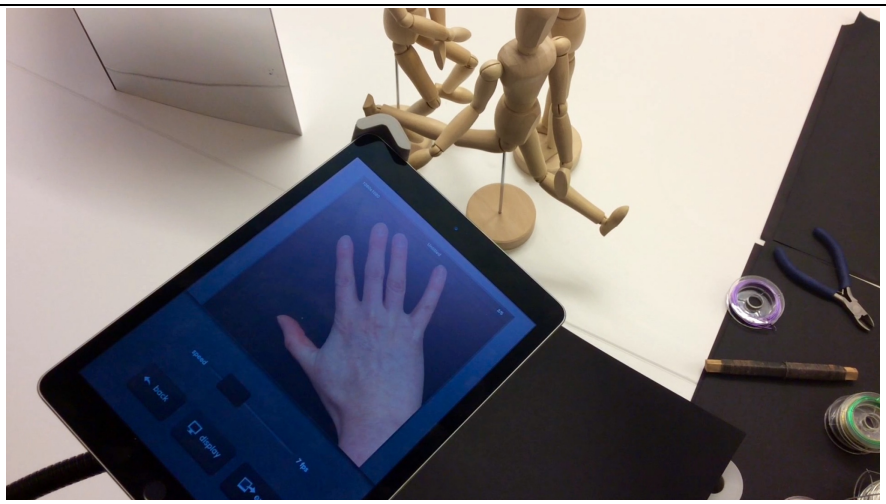

Figure 1.1: iPad motion capture, mannequins and wire

Elsewhere, webcams and digital microscopes were positioned alongside non-digital tools, such as magnifiers and mirrors, which prompted close observation in different forms. Nearby, the digital image from the microscope was projected onto a large easel set up with paper and paints (see Figure 1.2). In these ways, a range of materials, both digital and non-digital, were provided for investigation.

Figure 1.2: Webcam, projector, mirrors and magnifiers

In addition to a range of pencils, pastels and paints provided for mark-making, an iPad was provided with a drawing app and stylus in a darkened room. The screen was projected onto a wall, enlarging the drawings and projecting them onto anyone who stood in front of the projector (see Figures 1.3 and 1.4) prompting shadow play with silhouettes and the effect of 'wearing' drawings on the body. Elsewhere in the atelier, webcams were connected to computer programmes which added filters and effects (e.g. Photo Booth), prompting 'selfies' which could be digitally manipulated and transformed. In the main hallway of the atelier, a projector displayed further images of the body and movement in art as inspiration (e.g. sculpture, dance, performance art), as did books and photographs displayed throughout the space.

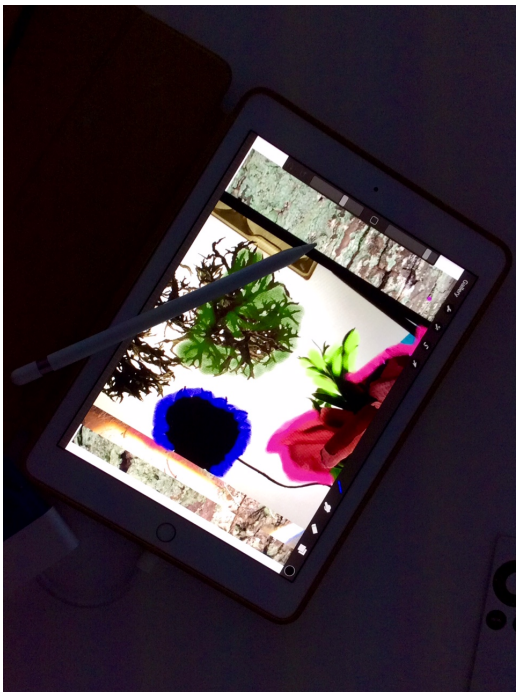

Figure 1.3: iPad and stylus, set up with a drawing app.

Figure 1.4: iPad projection onto the wall, alongside lights and torches

Throughout the atelier, rich opportunities for play, exploration and creative representation were offered in a variety of materials, both digital and analogue. The educators leading the training stated that they considered the digital very much part of the 'hundred languages' philosophy. They discussed the qualities of the materials, articulating what additional potentials they felt digital technologies offered for deepening enquiries and making connections with other forms. They seemed particularly welcoming of the possibilities of new technologies, but approached their use with a strong foundational pedagogy inspired by Reggio Emilia. In this sense, they conceived the digital as another language among the 'hundred languages'; one form of meaning making among many, with the connections between forms given particular thought and emphasis.

The training session in the atelier both gave value to digital meaning-making and recognised the need to support educators with use of new and emerging media. The fact it was a well-attended training session seems to indicate that this support is welcomed by the preschools. The training did not focus on developing isolated ICT skills or abstract technical competencies, but instead emphasised hands-on exploration and consideration of the digital within a wider pedagogical approach. Through such training, practitioners working in Stockholm's Reggio-inspired preschools were being supported to incorporate digital media into their existing approach in an embedded, critical way.

2. Discerning Selection of Digital Media: Music-making with iPads

In the classroom for one-year-old children at Katarina Västra preschool in Södermalm, digital tools were offered to the children every day amongst other materials, illustrating that digital media was not an occasional or bolt-on experience but was part of the fabric of the learning environment. For example, an iPad was offered as one means for exploring sound alongside resources such as drums and a large wooden xylophone positioned close by. Whilst I spoke with the educators, several young children tapped and swiped at the iPad whilst the screen was projected onto the wall for other children to see. The apps used by the children included Brian Eno's 'Bloom' app, described by the developers as 'part instrument, part composition and part artwork', which enabled children to create patterns and melodies by tapping the screen. Whilst several children played on the app, others wandered up to the projection on the wall or picked up nearby scarves and moved with the sounds.

A second app in use during the visit was ‘MadPad’ (see Figure 2.1), which had been used to create a board of sounds made by the children represented by their mark-making. By tapping the soundboard, the children could replay and remix their sounds in different combinations. Tapping and dragging with two fingers changed the pitch of the playback, a feature which the educators explained they had discovered through the children’s own explorations. This enabled the children to create their own sound compositions in new forms, which the educators had started recording and playing back to the children.

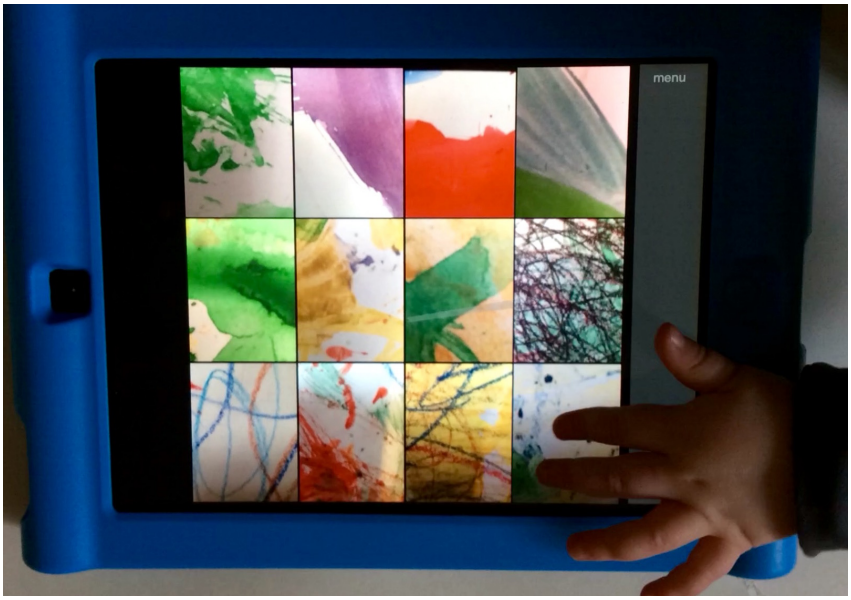

Figure 2.1: MadPad soundboard of children’s mark-making and sounds

The educators emphasised that they do not use the iPad simply as a ‘time-filler’ or something to keep the children quiet, but as a tool for active exploration. The educators spoke about the potential for digital forms to complement other materials, explaining that they felt the digital provided children with different experiences and offered further variation in the concepts they were exploring. They also suggested that digital tools

were differently accessible compared to traditional instruments and offered unusual manipulations of sound.

The educators spoke about the importance of finding apps that are open-ended, creative, multi-touch (to enable several children to collaborate at the iPad) and which combine multiple modes, such as image, moving image and sound. These observations highlighted that the educators were discerning and critical users of digital media with the young children, being selective and purposeful in their choices of which apps and technologies to use. They were also highly reflective about their rationale and underlying approach, which seemed to be helpful in reassuring parents who were concerned about the appropriateness of digital media in preschools as well as for clarifying their own aims and pedagogy. However, the educators stated that it was difficult to find quality apps for young children, with an abundance of closed, procedural apps dominating the market. This highlights the particular need for practitioners to research and choose suitable apps carefully, and calls for software developers and the children's media industry to take note of the educators' call for more open-ended, creative and collaborative apps.

3. Valuing Children's Digital Cultures: Stop-motion Pokémon films

The teacher in the classroom for five-year-old children at Katarina Västra preschool shared a range of ways the children were using digital media to extend their exploration of projects. For instance, how the children had used a digital microscope to closely examine and capture images of ice crystals during Stockholm's snowy winter, prompting

identification of a parasite in the snow which the children then painted and characterised. Other characters which seemed to hold a deep fascination for the children in this class were Pokémon, from the popular location-based gaming app 'Pokémon Go' which involves collecting virtual monsters through augmented-reality, location-based play. The teacher explained that she felt it was important to honour the children's own cultures and interests, including their extensive knowledge of Pokémon, and to use this enthusiasm and expertise within the preschool projects. The teacher mentioned that some parents had initially been unsure about this focus, but that rather than restricting or banning Pokémon, she attempted to engage in non-judgmental open discussions with parents to hear their concerns and explain her rationale for including popular culture in the classroom.

During my visit, several children were busy creating Pokémon out of picture beads, which they arranged on small pegboards to be ironed and fused together, giving a pixelated effect (see Figure 3.1). Some children had created representations of their favourite Pokémon from the game, and others had made up new imaginary characters. Their resulting creations were scanned and mounted onto card to create a library of different Pokémon characters which the children used and shared as figures in their play. The Pokémon creation had been ongoing for many months, and the teacher explained she had recently introduced stop-motion video recording using the iPad, enabling the children to record their play and create their own Pokémon films. The children worked with the iPad in a fixed position to take a series of stills using a motion-capture app, animating these into short films which they were beginning to record soundtracks and narrations for (see Figures 3.2 and 3.3).

Figure 3.1: Pokémon characters created with picture beads

The teacher explained that she saw digital tools as part of the 'hundred languages' and explained that digital media could not only complement enquiries with the children, but also extend and go deeper into concepts through providing different forms for expression and thinking. She was also reflective about the limitations of the digital. For instance, she explained that she used Cuisenaire rods with the children to enable tactile, hands-on manipulation of three-dimensional number and quantity in a way that digital technology does not currently offer. This approach showed ways in which children's own digital media cultures were welcomed into the classroom, using their fascinations and expertise as the basis for ongoing projects and providing digital tools to sympathetically extend this in a digital form. In this way, the examples from the classroom demonstrate a deeply held respect for children's own experiences, including their experiences of digital media, and willingness to use these as the basis for open-ended learning.

Figure 3.2: iPad recording stop-motion, Pokémon characters and set

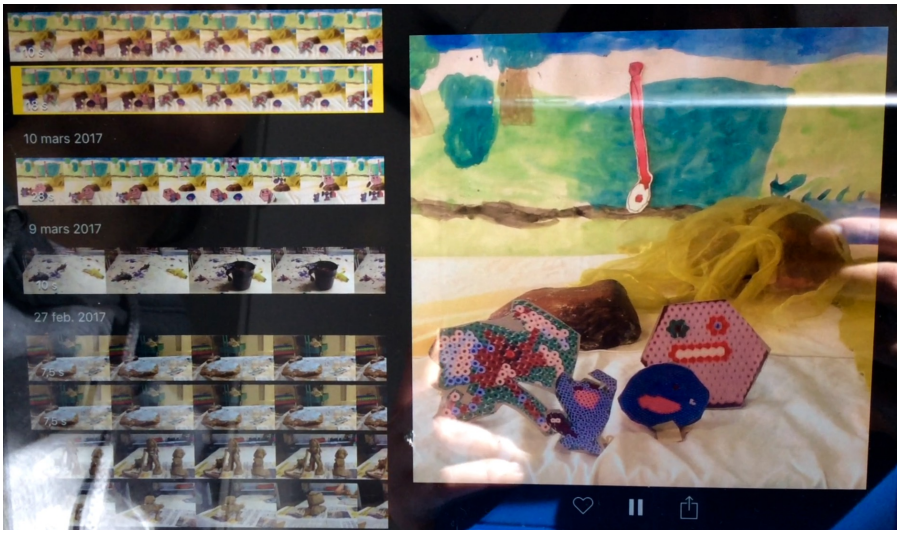

Figure 3.3: Pokémon stop motion film recording

4. Moving Between Digital and Non-digital Forms: Investigating bubbles through 'multi-stations'

Vintergatan Preschool is one site in an ongoing Erasmus+ funded collaboration between preschool educators in Sweden and England. The three-year project, 'We

Think Everywhere – Digital Languages and Creative Pedagogies' explores how digital technologies can be used in creative and expressive ways to create new knowledge, communicate and express learning. The project involves teacher exchange visits, sharing of practice and use of synchronous online communication via Skype to enable children and educators in Sweden and England to connect virtually and share practice relating to the use of digital technologies in early childhood.

The 'We Think Everywhere' research group is particularly influenced by the work of Gregory Bateson, including his ideas on cybernetics, systems, patterns and relationships (Bateson, 2002), and how these theories might support the pedagogy of teachers. One pedagogical approach which seemed to encapsulate these ideas was the Vintergatan Preschool's use of 'multi-stations', which supported children to move between different materials and experiences in order to investigate a concept in many different ways. In this preschool the children were invited to move from station to station (which might, for instance, offer drawing, role play, sculpture, digital technology etc.), prompting them to explore a concept through new associations, comparisons and connections.

Pedagogical documentation for the 'We Think Everywhere' project recorded a multi-station exploration at the Vintergatan preschool involving children aged one to three investigating bubbles. The exploration began in a puddle in the woods and was developed into deeper exploration through providing multi-stations including hands-on exploration of bubbles of various kinds, drawing bubbles to try and explore what a bubble is or might be, a bubble app on an iPad projected onto the wall to explore bubble movement and sound, photographing and 'catching' bubbles with digital cameras.

This approach offered children opportunities to compare, discover similarities and differences, and connect their ideas and thought processes through multiple forms, including digital media. This Bateson-inspired practice has similarities to the Reggio 'hundred languages' approach and multimodality, acting as a conceptual foundation for pedagogy that offers the digital in combination with other forms, valuing movement between forms. It again highlighted a willingness of the Swedish preschool educators to connect with children's own experiences and to ensure digital technologies are interwoven daily with non-digital forms. The educators demonstrated a commitment to exploring different digital tools and finding out what they make possible, offering them as alternative and additional forms for young children to express their ideas and understandings.

5. Digital Languages, Diversity and Democracy: Representing communities through digital photography

Rösberga Preschool in Södertäjle serves an area of Stockholm with a particularly high proportion of families who came to Sweden as refugees, predominantly Assyrians from Turkey in the 1960s-70s and more recently from Iraq, Syria and across Europe. Rösberga is also a distinctive preschool as it has become known for supporting children with a range of special educational needs and disabilities, both through inclusion in the preschool classes and through a specialist classroom with a higher ratio of adults to children. The post-war Swedish preschool movement was founded on the concept of 'a school for all', and the preschool's ethos welcomed and celebrated diversity:

At Rösberga Preschool we see diversity as an asset … Our work is based on everyone's right to be different and everyone's right to feel respected in their diversity, be it cultural or individual. (Rösberga Förskolecenter, 2017)

During the visit, the preschool teacher at Rösberga stated that the ideas of Reggio Emilia offered a helpful foundation to their work and supported meaningful inclusion. She explained that a particular benefit in their preschool context was the value Reggio's 'hundred languages' approach gave to diverse forms of communication and expression. She suggested that whilst many of their children may not speak Swedish or be able to communicate verbally, the hundred languages (including 'digital languages') enabled all children to access and contribute to projects in diverse ways. From her perspective, the 'hundred languages' seemed to support a highly democratic approach to meaning-making, recognising and valuing multiple forms of communication beyond language.

Throughout the preschool, the digital was used alongside and in combination with other forms for meaning making. For example, sensory technologies such as light boxes and music were used in a designated room for relaxation alongside ball pools and waterbeds, and digital microscopes and projectors were used in the atelier space to explore scale and perspective in their creative activities such as observational painting.

Figure 5.1: Digital photographs of the neighbourhood, taken by the children

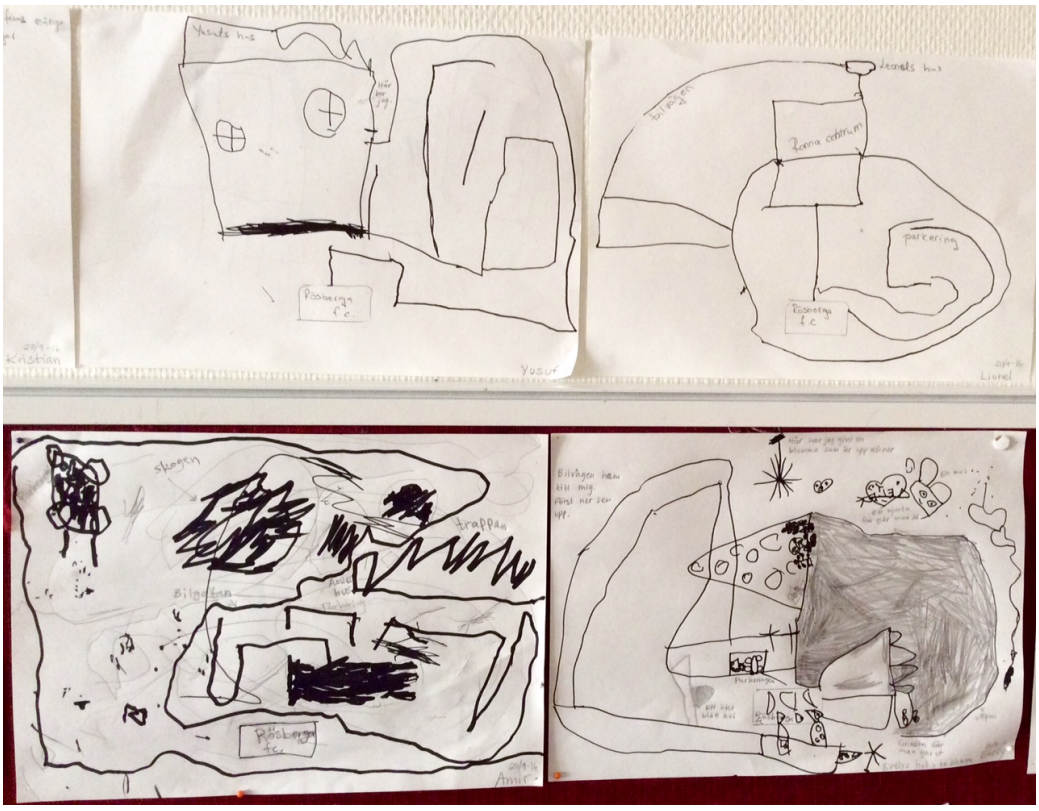

Figure 5.2: Children's maps of Ronna

Digital technologies also featured in an ongoing whole-centre project which related to the local neighbourhood, Ronna. Whilst the educators explained that the area carries something of a negative reputation, the project sought to build the children's pride in their locality through explorations such as visits, map-making and digital photography. On their visits to the local town centre, the children took digital photographs of familiar sights to display, discuss and share in the preschool (see Figures 5.1 and 5.2). These were displayed with children's maps and drawings of the local area. The children were also given cameras to take pictures of each other, encouraging the children to recognise and celebrate both individuality and diversity, such as through the display of the eyes of the different children in the class (see Figure 5.3).

Figure 5.3: Digital photographs of the children's eyes

These multiple forms of meaning making enabled all children to contribute to and access the projects in some way, without reliance on verbal communication. Both the focuses of the projects and their multimodal form seemed to demonstrate that linguistic, social and ethnic diversity was celebrated and valued throughout the centre. This

seemed to be supported by the democratic foundations of the Swedish preschool curriculum and in particular the 'hundred languages' approach to expanding communication and expression.

Discussion

The visits offered insights into the teacher training and day-to-day uses of digital technologies in Swedish early years classrooms inspired by Reggio Emilia. Whilst the training session and the preschool visits were selected to demonstrate examples of 'good practice' and cannot be generalized to Sweden or Reggio-inspired practice as a whole, the vignettes suggest the following key themes are significant and supportive of children's digital meaning-making:

- Consideration of digital tools as part of a 'hundred languages' approach
- Exploration of different tools, both digital and non-digital, and evaluation of what each form makes possible
- Embedding of digital tools into the day-to-day fabric of practice
- Respect for children's own experiences, including their experiences of digital media and digital technologies
- Evalutation and screening of technology to ensure it is coherent with the preschool's broader educational ethos.

It is recognised that these dimensions to practice were made possible by a particularly enabling context. Whilst this was a short and small-scale research visit, the findings offer insights into the conditions that might be supportive of young children's digital

meaning making, including the conceptual foundations, professional development opportunities and pedagogies which seemed to support this.

Foundations for digital meaning making

The influence of Reggio Emilia is evident within the curriculum and teacher training in Sweden, owing much to longstanding collaboration between Reggio Children and Stockholm University, including the 'Stockholm Project' (Dahlberg et al., 1999), establishment of the Stockholm Reggio Emilia Institute and development of the preschool curriculum in 1998 (revised 2010). Rather than mimicry or formulaic implementation of a Reggio 'model', this ongoing collaboration between Sweden and Reggio Emilia has been developed through dialogue, reflection and building upon the Swedish play-centred preschool tradition and the country's social democratic history. The fundamental preschool curriculum values of democracy, equality and solidarity are underpinned by a strong emphasis on play, creativity, sociability and enjoyment. Educators are not bound by pre-specified developmental scales and targets but guided by broad aims (for example, to "develop an interest in pictures, texts and different media, as well as the ability to make use of, interpret and talk about them" (Skolverket, 2010: 10). Simultaneously, Swedish policy-makers are placing particular emphasis on supporting young children's developing 'digital competencies'. It is within this context that digital meaning making was respectfully supported in practice.

The concept of 'digital languages' within the Reggio Emilia 'hundred languages' approach seemed particularly relevant to the Swedish educators, emphasising the distinct possibilities of digital tools whilst recognising that they offer one form of exploration among many others. The 'hundred languages' approach also emphasises the importance of connecting and combining forms, recognising the potentials and

constraints of digital media and valuing the process of representing concepts in different ways in order to expand possibilities for meaning making. Here there seem to be parallels with the concept of multimodality, which highlights that communication occurs in multiple modes, that modes have distinct 'affordances' which enable cognition differently, that 'transduction' between modes results in re-making of meaning, and that a 'generous recognition' of meaning making in its many and diverse forms is necessary (Bezemer & Kress, 2016; Kress, 1997, 2010). Multimodality features as a topic in the Stockholm Reggio Emilia Institute journal *Modern Childhood* (Herngren, 2016) and several of the educators met during the visits were familiar with the concept through their teacher training. This suggests that these theories have complemented the Reggio Emilia approach which was then manifested in their practice.

Whilst there seems to be a productive complementarity between Reggio Emilia and multimodality, certain tensions persist. Fundamentally, the use of the term 'language' in 'hundred languages' is at odds with a multimodal approach in which language is not seen as central and where conceptualising modes as 'languages' might be considered a limiting and counter-productive metaphor. Furthermore, academics may be reluctant to draw upon Reggio Emilia since it may appear focused on practice and lacking a traditional empirical research base. This is likely to be contested by those involved in Reggio Emilia itself, who would argue they are researching their own practice and generating evidence of a distinct kind, embodying research as a way of thinking (Giudici & Barchi, 2011). This alternative conceptualisation of research may be what is particularly accessible and appealing about Reggio Emilia to educators. However, these ideas may not carry weight with traditional academic establishments. If academics are genuine about connecting theory and practice, further engagement in the complementarities between Reggio Emilia and multimodality seem productive both for

articulating, refining and sharing the theories within the Reggio approach, and in making multimodal pedagogies visible, accessible and meaningful to educators.

Supporting and Developing Digital Partnerships

In addition to the rich theoretical foundations for meaning-making with digital technologies, there also seemed to be a concerted effort to continue developing practice in Stockholm including calls for increased practitioner support and learning opportunities (Karlsson Lohmander, 2017; Skolverket, 2016). This seemed to be taking place through partnerships between universities, educators, policy-makers, digital technology companies and other organisations, such as the Stockholm Reggio Emilia Institute. Whilst the Stockholm Reggio Emilia Institute is no longer strongly connected to the Stockholm University, its 'Digital Workshops' and other training programmes offer ongoing support for professional development in using digital media, including being supported by a designated digital expert, a 'digitalista'. The Institute's plans to host the Reggio Emilia digital exhibition 'Border Crossings' and to establish public digital ateliers for the city indicate further provision and support for developing and raising the profile of digital literacy.

Networks of preschools also seemed instrumental for meeting, sharing and reflecting upon digital technology practice, and this was a particular focus in the 'We Think Everywhere' project. In combination, these partnerships recognise and address the need for ongoing development supporting preschool practice with digital media (Kontovourki et al., 2017; Marsh, Kontovourki, Tafa, & Salomaa, 2017), informed by robust research and dynamic collaborations which work meaningfully with practitioners to support digital meaning making.

Pedagogy and Practice: Embedded and Everyday Digital Media

The preschool visits revealed classrooms where digital media was deeply embedded and used everyday, as part of the weft and weave of the educators' practice (Pahl, 2002; Parry, 2013). The digital was embraced as offering distinct possibilities, and was used in combination with a multitude of traditional forms for meaning making. The educators articulated the pedagogy behind their use of digital media and demonstrated a considered and critical approach to what technologies might be used with the children, why and how.

The educators acknowledged that using digital media raised certain challenges. For instance, they spoke of the variation in practice from preschool to preschool and welcomed initiatives such as the Swedish Government's new curriculum for providing clearer guidance. A related theme was that meaningful use of digital media depended on teacher confidence and time to reflect, share and develop practice. Educators also mentioned the concerns of parents regarding the appropriateness of using digital media in preschools, but they commented that open discussions about the pedagogy surrounding digital tools helped to alleviate worries. Finally, and crucially, the educators stated that they felt closed, procedural apps dominated the market, requiring a discerning approach to choosing and using apps. This calls for the children's media industry to provide more digital media which is open-ended, creative and collaborative, in order to supporting the educators' broader ethos and pedagogy.

Conclusion

Whilst debates endure surrounding the role of digital media in early childhood education, the Swedish preschools demonstrated optimism regarding the new possibilities of digital tools, seeing them as additional forms for exploration and meaning

making, using them in combination with non-digital materials and evaluating their potentials and constraints. This balanced approach to digital meaning making seems to have been supported by the conceptual foundations of the Swedish preschool curriculum, which is broad, play-based and extends to the age of seven. This has been supported further through a focus by Swedish policy-makers on the importance of digital literacy, providing a range of ongoing research-practice collaborations and opportunities for professional development. This raises possibilities for the use of similar approaches beyond early childhood and beyond the Swedish context. For example, Reggio Emilia's studio-based approach to meaning making, and its adaptation in Swedish preschools, may resonate with the growing interest in 'maker' culture seen in makerspaces and Fab Labs (see Marsh et al., 2017).

The Reggio Emilia concept of children's 'hundred languages' seems to provide a particularly rich foundation for supporting digital meaning making. In many ways, it is an approach which encapsulates a multimodal perspective, supporting practice in which digital media are acknowledged as an important part of young children's experience, a valuable way in which to make meaning in combination with other forms, and enabling democratic recognition of the meaning making of many.

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