Digital Languages: Multimodal meaning-making in Reggio-inspired early years education

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Summary

This collaboration between UCL Institute of Education and Stockholm University provided invaluable insights into theory, methods and practice surrounding digital technologies in Swedish preschool education. Potentials and challenges within the concept of 'digital languages' were explored through discussions with leading academics working in the field of digital technologies, multimodality and Reggio Emilia. Sharing my work through a research seminar at Stockholm University enabled an exchange of ideas surrounding multimodal research, fostering new connections with academics in early childhood education. Meetings and workshops with the Stockholm Reggio Emilia Institute highlighted the strong conceptual foundation for digital technologies within a 'hundred languages' approach and the ongoing support and training being offered to educators. These knowledge exchange activities were enhanced by visits to three Reggio-inspired Swedish preschool settings to observe and discuss their use of digital technologies in practice.

The preschool visits revealed a multitude of ways in which educators are embedding digital technologies in their everyday practice and using the digital in combination with traditional forms. The teachers I encountered were enthusiastic about new possibilities of digital technologies, saw them as additional forms for exploration and meaning-making, used them in combination with non-digital materials and were thoughtful and articulate about their potentials and constraints. The Reggio Emilia concept of children's 'hundred languages' seemed to provide a rich foundation for using digital technologies to support young children's multimodal meaning-making. In Stockholm this was underpinned by a broad, Reggio-inspired, play-centred curriculum to the age of 6, teacher training which introduces the concept of 'multimodality', ongoing professional development opportunities, school networks and research collaborations focusing specifically on the digital.

This study visit has been a fascinating opportunity to share knowledge and gain insights into Swedish preschool education, offering opportunities for reflection upon the theory, methodologies and practices relating to multimodal meaning-making with digital technologies. I am deeply grateful to all who made this visit possible and who took the time to show me their work and answer my questions so thoughtfully.

Rationale and Aims

Digital technology in early years education often evokes responses ranging from strongly negative rejections to unquestioned positive endorsements (Plowman, Stephen, & McPake, 2010). The purpose of this visit was to seek out a more balanced, evaluative approach to the debate, adopting a multimodal perspective which recognises that meaning-making occurs in many modes beyond language (such as image, sound, gesture) and focusing attention on the *potentials* and *constraints* of new technologies (see Flewitt, 2011; Jewitt, 2006; Kress, 2005; Kress & Cowan, Forthcoming). This project set out to explore possible connections between such a multimodal perspective on young children's meaning-making and the approach adopted in many Swedish early years settings inspired by the Reggio Emilia preschools of Northern Italy.

Reggio Emilia has become synonymous with creative, child-centred pedagogy founded upon the rights and the communicative potentials of all children. Central to the Reggio Emilia approach is the concept of the child's 'hundred languages', a theory which seeks to recognise, support and give value to the many forms of expression children use to make meaning, beyond those of speech and writing (Edwards, Gandini, & Forman, 1998). Whilst 'languages' in Reggio Emilia have often been considered in terms of natural materials (clay, wire, paint, light etc.), attention has recently shifted to include consideration of 'digital languages' (Scuola Comunale Dell'Infanzia Diana, 2012). This emerging interest in the digital potentially offers new ways of understanding and working with digital technologies, founded on Reggio Emilia's strong pedagogy of meaning-making in multiple forms.

Stockholm University is internationally recognised for its expertise in early childhood education and has pioneered collaborative teacher-research, practitioner development and classroom practice informed by the principles of Reggio Emilia. This has included the 'Stockholm Project' (Dahlberg, Moss, & Pence, 1999) and development of the Stockholm Reggio Emilia Institute, an organization which supports Reggio-inspired preschool practice through lectures, courses, workshops and publications. More recently, Stockholm University researchers have undertaken groundbreaking projects on the use of computers and tablets in preschools to investigate digital environments, children's play and design (Kjällander, 2013; Kjällander & Moinian, 2014; Kjällander, Moinian, & Dorls, 2016).

The research visit focused on three interconnected theoretical, methodological and practical aims:

> 1) To explore **theoretical** perspectives on children's digital technology use through discussion of multimodal social semiotic theory 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.

Overview of Activities

In combination, the visit's aims sought to articulate a balanced approach to multimodal meaning-making with digital technologies through exploring the concept of 'digital languages'. The visit's activities covered three key areas, corresponding to the aims above:

1) **Theory:** Discussions with Swedish researchers and practitioners working in the areas of digital technologies and/or Reggio Emilia, sharing perspectives on children's technology use and identifying complementarities of respective theory.
2) **Methodology:** Dialogue with the Stockholm Reggio Emilia Institute and consideration of its role in supporting preschool practice. Discussions with practitioners about their experiences of working collaboratively with the Stockholm Reggio Emilia Institute, Stockholm University and other networks. A seminar delivered at Stockholm University sharing methodological insights relating to multimodal research.
3) **Practice:** Visits to Reggio-inspired preschools to observe the concept of 'digital languages' in practice, including conversations with practitioners relating to the digital technologies that are provided and the pedagogy adopted in relation to their use.

Date	Activities
Friday 10th March	Initial meeting with STSM host, Dr. Susanne Kjällander (Senior Lecturer, Stockholm University)
Monday 13th March	Meeting with Dr. Mia Heikkilä (Senior Lecturer, Mälardalen University) Meeting with Professor Emerita Gunilla Dahlberg and Dr Susanne Kjällander (Stockholm University) Meeting with Greger Rösnes (Director, Stockholm Reggio Emilia Institute) *'Digital Workshop and Exploration'* with Karin Gandini (Digital Creative Trainer) and Maria Kozlowska (Atelierista), Stockholm Reggio Emilia Institute
Tuesday 14th March	**Seminar delivered at Stockholm University:** *'Re-representation of multimodal empirical material'* – Kate Cowan Approximately 15 attendees including researchers from Stockholm University, Södertörn University and Mittuniversitet: Mid Sweden University.
Wednesday 15th March	**School Visit 1:** Katarina Västra Preschool, Södermalm Meetings with Anna Larsén (Headteacher), Sanna Olsson (Teacher), Maria Fabien (Atelierista), Erika Lewis (Teacher)
Thursday 16th March	**School Visit 2:** Vintergatan Preschool, Kärrtorp Meeting with Helen Kärnebro (School Network Leader/Assistant Headteacher)
Friday 17th March	**School Visit 3:** Rösberga Förskolecenter, Ronna, Södertäjle Meeting with Matilda Nilsson (Teacher/MA Early Years Education student)

Findings and Key Themes

My visit to Stockholm proved to be extremely timely, coinciding with a government announcement regarding digital literacy in the national curriculum (Regeringskansliet / Government Offices of Sweden, 2017). Informed by consultations with researchers, forthcoming changes to the curriculum will place greater emphasis on aspects such as critical media literacy, digital texts, programming and creative problem-solving with digital technology. Whilst these guidelines will apply specifically to the primary and secondary curricula, they illustrate that digital technology is a topic high on the agenda of the Swedish Government, and seems to suggest a willingness of policy-makers to engage with researchers in the area of digital literacy.

Whilst my time in Stockholm was relatively short, and the preschools I visited were in many ways different, the practice I observed with digital technologies offered rich insights into how they were used to support multimodal meaning-making. I have selected five examples of practice and use these vignettes to illustrate the pedagogical approach to 'digital languages' which I encountered during my research visit.

1. Embedding Digital Technologies in Practice: Exploring the body in digital and non-digital combinations

In December 2016 Stockholm Reggio Emilia Institute established a new 'atelier' studio space to carry out training with educators. During my time in Stockholm, the atelier was holding a 'Digital Workshop and Exploration' for preschool teachers led by digital creative Karin Gandini and atelierista Maria Kozlowska. This training took place over multiple sessions, offering educators practical exploration of different digital tools, experience combining digital and non-digital forms, and support developing visual communication relating to pedagogical documentation. After an initial input from Maria and Karin, the educators were invited to explore the atelier for themselves in groups of three, with two people in each group investigating the various materials and the third person documenting their explorations. The groups then came together to share and discuss their experiences through showing their creations and digital documentation of the process.
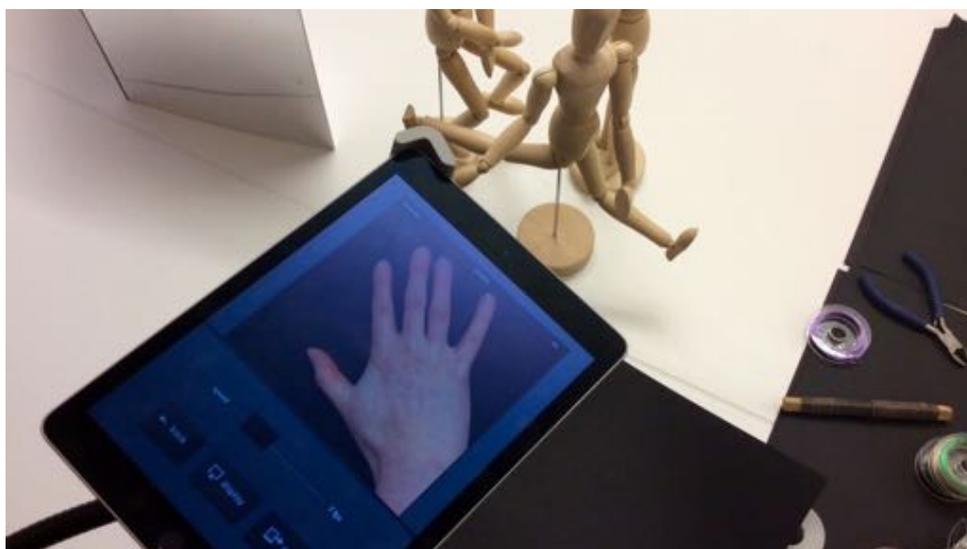

Figure 1.1: iPad motion capture, mannequins and wire

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 atelier, digital tools were presented alongside 'traditional' forms. 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). This offered a means of capturing the movement of the various malleable materials, the wooden figures and the body. Elsewhere, webcams and digital microscopes were offered alongside non-digital tools for close observation, such as magnifiers and mirrors, which could be used to carefully examine parts of the body such as skin and eyes. The digital image was projected onto a large easel set up with paper and paints (see Figure 1.2).

Figure 1.2: Webcam, projector, mirrors and magnifiers

In addition to a range of paints, pencils and pastels 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). This invited 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 digital transformation and manipulation of the face and body. In the main hallway of the atelier, a projector displayed 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 (Left): iPad and stylus, set up with a drawing app.
Figure 1.4 (Right): iPad projection onto the wall, alongside lights and torches

*Rich opportunities for play, exploration and creative representation were offered in a variety of materials, both digital and analog. Karin and Maria seemed to have given careful thought to the 'affordances' of the materials, considering what additional potentials digital technologies might offer for deepening enquiries and making connections with other forms. I asked Karin if she considered the digital part of the 'hundred languages', to which she answered, "Absolutely - very much so". Karin 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, the digital was **another** language among the 'hundred languages'; one form among many, with the **connections** between forms given particular thought and emphasis.*

The fact that the Stockholm Reggio Emilia Institute had designed a programme of educator development related to digital technologies seemed to both give value to 'digital languages' and recognise of the need to support educators in this new and emerging form for meaning-making. The fact it was a well-attended programme seems to indicate that this training is welcomed by the preschools. The training did not focus on developing isolated ICT skills or abstract technical competencies, instead emphasising hands-on exploration and consideration of the digital within a wider pedagogical approach. It seemed that through such training, practitioners working in Stockholm's Reggio-inspired preschools were being encouraged and supported to incorporate digital technologies into their existing approach in an embedded, considered way.

The provision of digital workshops for educators is likely to continue and grow, as the Stockholm Reggio Emilia Institute hopes to host the Reggio Emilia exhibition 'Border Crossings', focusing on the interplay between the digital and other forms. This initiative involves plans to open digital ateliers in the city and surroundings linked to the exhibition to invite further exploration of digital technologies in preschools.

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

In the classroom for one-year-old children at Katarina Västra preschool in Södermalm, educators Sanna Olsson and Maria Fabien had evidently given careful thought to their use of digital technology with the youngest children in the preschool. What was apparent here, as at the atelier workshop, was that opportunities for digital meaning-making existed alongside other materials for exploration. For example, the iPad was being offered as one means for exploring sound alongside resources such as drums and a large wooden xylophone positioned close by.

Some form of technology was offered to the children every day amongst other materials, illustrating that digital technology was not an occasional or remote experience but was part of the fabric of the learning environment. Whilst I spoke with the educators, several young children tapped and swiped at an iPad with the screen projected the screen onto the wall. The apps 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, others wandered up to the projection on the wall or picked up nearby scarves and moved with the sounds. A second app I witnessed 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 remix their sounds in any combination. Tapping and dragging with two fingers changed the pitch of the playback (a feature which the educators had discovered through the children's own explorations). This enabled the children to create their own sound compositions in new forms, which Maria and Sanna had recently begun recording and playing back to the children. They spoke of how this was accessible to the children in different ways to traditional instruments, and offered different manipulations of sound.
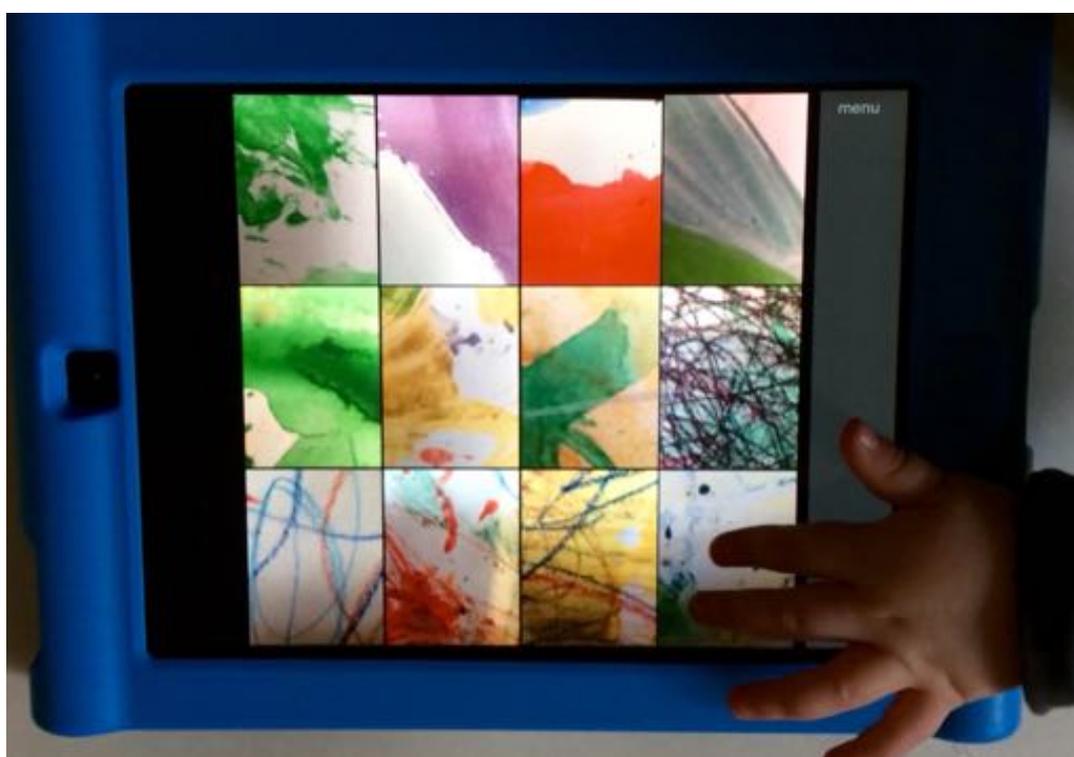
Figure 2.1: MadPad soundboard of children's mark-making and sounds

*It was evident that the educators were highly discerning in their use of digital technologies. They 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. Sanna stated that they do not use the iPad simply as a 'time-filler' or something to keep the children quiet, but mentioned that it was difficult to find quality apps for with young children, with an abundance of closed, procedural apps dominating the market. They spoke of the need to research and choose suitable apps carefully. The preschool has an ongoing collaboration with the Stockholm Reggio Emilia Institute where Maria lectures about digital technology, sharing their recommendations and expertise with other teachers.*

*Sanna and Maria spoke articulately about the ethos behind the use of digital technologies, discussing the potential for digital forms to **complement** other materials, for providing the children with **different** experiences and for offering further **variation** in the concepts they were exploring. Sanna mentioned that multimodality and the work of Gunther Kress had been part of her teacher training at Stockholm University and this seemed to have been influential to their practice.*

*These observations highlighted that the educators were **critical** users of digital technology with the children, being **selective and purposeful** in their choices of which apps and technologies to use. They were also extremely **articulate** about their rationale and underlying approach, which seemed to be helpful in reassuring parents who were concerned about the appropriateness of digital technologies in preschools as well as for clarifying their own aims and pedagogy.*

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

In the classroom for five-year-old children at Katarina Västra I met with the class teacher, Erika Lewis, who showed me a range of ways the children were using digital technologies to extend their exploration of projects. For instance, she showed me 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 Erika's class were Pokémon, from the popular location-based gaming app 'Pokémon Go' which involves collecting virtual monsters through augmented-reality play. Erika 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. She mentioned that some parents had initially been unsure, but that rather than restricting or banning Pokémon, Erika felt it was important to engage in 'non-judgmental open discussions' with parents to hear their concerns and explain her rationale for including popular culture in the classroom.

While I spoke with Erika, 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 copied and mounted onto card to create a catalogue or 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 Erika 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 had created a set for their filming and 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

*When I asked Erika if she considered digital technologies part of the 'hundred languages' she was adamant, "Oh definitely! Definitely." She spoke about her belief that digital technologies could not only **complement** enquiries but also **extend** and go **deeper** into concepts through providing different forms for expression and thinking. Erika was also reflective about the **limitations** of digital technology. 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 balanced approach welcomed children's own **digital media cultures** into the classroom, using their fascinations and expertise as the basis for ongoing projects and providing digital tools that sympathetically extended this in a digital form.*

Figure 3.2 (Left): iPad recording stop-motion, Pokémon characters and set
Figure 3.3 (Right): Pokémon stop motion film recording

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

At Vintergatan Preschool I witnessed an ongoing Erasmus+ funded collaboration between preschool educators in Sweden and England coordinated by Helen Kärnebro and Debi Keyte-Hartland. The three-year project, 'We Think Everywhere – Digital Languages and Creative Pedagogies' is interested in 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. The project aims to create a body of research in the form of case studies, publications, a conference and a range of online resources.

The 'We Think Everywhere' research group is particularly influenced by the work of Gregory Bateson, including his ideas on cybernetics, systems, patterns and relationships. Helen Kärnebro explained how this influences her work as a school network leader in supporting 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. Helen explained that from station to station (which might, for instance, offer drawing, role play, sculpture, digital technology etc.) the children are prompted 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 1-3 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, and so on.

This approach offered children opportunities to compare, discover similarities and differences, and connect their ideas and thought processes through multiple forms, including digital technologies. This Bateson-inspired practice has similarities to the Reggio 'hundred languages' approach and multimodality, acting as a conceptual foundation for pedagogy that offers digital technologies in **combination** with other forms and values movement **between** forms. The outcomes of the 'We Think Everywhere' project will offer further illustrations of such an approach and ways in which digital technologies can be used as part of creative, expressive meaning-making.

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)

Matilda Nilsson, one of the preschool teachers at Rösberga who is currently completing an MA in Early Years Education at UCL Institute of Education suggested that the ideas of Reggio Emilia offered a helpful foundation to their work which supported meaningful inclusion. Matilda said 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. In this way, the 'hundred languages' seems to be a highly democratic approach to meaning-making, recognising and valuing multiple forms of communication beyond language.

Throughout the preschool, digital technologies were 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 (Left): Digital photographs of the neighbourhood, taken by the children
Figure 5.2 (Right): Children's maps of Ronna

Digital technologies also featured in an ongoing whole-centre project which related to the local neighbourhood, Ronna. Whilst Matilda explained that the area carries something of a negative reputation, their project has 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

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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.

Conclusions

The visits and activities I carried out in Stockholm offered many rich insights into young children's multimodal meaning-making with digital technologies, as well as the conceptual foundations, methodological collaborations and pedagogical practices which seemed to support this. Whilst this was a short and small-scale research trip, here I draw together some common themes and reflections related to the interconnected aims of the project.

Theoretical Perspectives: Foundations for meaning-making with digital technologies

The influence of Reggio Emilia seems part of the fabric of the curriculum and teacher training in Sweden, owing much to Professor Gunilla Dahlberg's longstanding work with 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 approach', 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 "give children the opportunity to develop their ability to communicate, document and describe their impressions, experiences, ideas and thinking processes by means of words, concrete materials and pictures, as well as aesthetic and other forms of expression" (Skolverket, 2010: 11)). It is within this context that the meaningful incorporation of digital technologies was supported.

The concept of 'digital languages' within the Reggio Emilia 'hundred languages' approach seemed particularly helpful to Swedish educators, emphasising the distinct possibilities of digital technologies 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 technologies and valuing the process of representing concepts in different ways in order to expand possibilities for meaning-making. Here there seem to be many 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 I spoke to were familiar with the concept through reading Gunther Kress' work as part of their teacher training. This suggests that these theories may have complemented the Reggio Emilia approach which was central to their education studies.

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, as often espoused in 'impact' statements of universities, perhaps further engagement in the complementarities between Reggio Emilia and multimodality would be productive both for articulating, refining and sharing the theories within the Reggio approach, and in making multimodal pedagogies visible, accessible and meaningful to educators.

Methodological Collaborations: 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 research and practice in this area 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 incorporating digital technologies, 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 digital pedagogy. Networks of preschools also seemed instrumental for meeting, sharing and reflecting upon digital technology practice, and this was a particular focus in the ongoing Erasmus+ funded 'We Think Everywhere' project.

In combination, these partnerships recognise and address the need for ongoing development supporting preschool practice with digital technologies (Kontovourki et al., 2017; Marsh, Kontovourki, Tafa, & Salomaa, 2017), informed by robust research and dynamic collaborations which work meaningfully with practitioners in developing digital pedagogy.

Pedagogy and Practice: Embedded and Everyday Digital Technologies

In the settings I visited, digital technologies were an embedded and everyday part of preschool practice. Digital technologies were embraced as offering distinct possibilities, used in combination with a multitude of traditional forms for meaning-making. The educators spoke thoughtfully and articulately about the pedagogy behind their use of digital technologies, and they demonstrated a considered and critical approach to what technologies might be used with the children, how and why.

The educators and researchers I spoke with acknowledged that using digital technologies raised certain challenges. For instance, some 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 technologies 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 technologies in preschools, but they commented that open discussions about the pedagogy surrounding digital technologies helped to alleviate worries. Finally, the comments of the teachers suggested that there is currently a limited selection of open-ended, creative, collaborative apps for children, and that a discerning approach to choosing and using apps is needed.

To summarise, the balanced approach to meaning-making with digital technologies I witnessed during my time in Stockholm seems to have been supported by the conceptual foundations of the preschool curriculum, influenced strongly by Reggio Emilia and resonating with multimodality. This has been supported further through a range of ongoing research-practice collaborations and opportunities for reflection and professional development. This seemed to support preschool pedagogies in which digital technologies are valued as another way in which to make meaning, and to enable democratic recognition of the meaning-making of many.

Future Outputs

This research visit offered valuable opportunities to connect with others working in the fields of Reggio Emilia, multimodality and digital technologies in early childhood education. A range of further activities and outputs are planned relating to this trip, including:

- A presentation at the DigiLitEY Training School, Madrid
- A seminar for the Centre for Multimodal Research, UCL Institute of Education
- A seminar for the Department of Learning and Leadership, UCL Institute of Education
- A workshop for London ReFocus, the regional network of the UK Reggio Emilia organization 'Sightlines'
- A blog post for the DigiLitEY website
- A blog post for the Teachwire website
- Input into teaching on the Early Years Education MA programmes at UCL Institute of Education (online and face-to-face)

In addition, I hope many of the connections established in Stockholm might be sustained and developed in longer-term projects, such as through organising conference symposia, considering joint publications and supporting Swedish researchers to present their work at the Centre for Multimodal Research or London ReFocus networks.

Final Comments

I am deeply grateful to DigiLitEY for supporting this collaboration, to Dr. Susanne Kjällander and Professor Gunilla Dahlberg for supporting my application, and to everyone who welcomed me so warmly in Stockholm and made the time to meet and share their work.

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