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Chapter objectives

This chapter is the final for Section 3 and in many ways stands as an example of how many of the individual elements presented thus far in the book, can come together in a holistic way. This chapter demonstrates how we can adopt play, make it unique to the project and the children and still arrive at meaningful research data.

This chapter describes a research project wherein 3- to 6-year-old Finnish children's digital literacies were studied and supported via playful methods. The key theses this chapter advocates are:

- The use of playful methods in early childhood education (ECE) research is one way to acknowledge and respect the characteristics of the research context.
- The ambiguity of play should be acknowledged when planning, conducting, and evaluating playful research projects.
- Studying and supporting children's digital literacies do not always require digital devices.

The chapter is structured as follows. First, a reflective discussion on the ambiguity of play and the use of playful methods as a context-sensitive research approach is presented. Then, an overview of the research project and its objectives are provided. In the end, three concrete examples of how the children's digital literacy was studied and supported using playful methods are given.

Play or playful(ness): Entering the gray area

In August 2019, a major Finnish newspaper interviewed me about a game design study we had conducted with a group of preschoolers (Mertala and Meriläinen, 2019). In the interview, I mentioned that the study was perhaps the most fun project I had ever been involved in. Interestingly, one reader commented that because the project was fun, it was not proper research. I have given this comment a great deal of thought, and the more I think about it, the more I oppose it. Conversely, I would argue that fun is a requisite for conducting high-quality research with young children in the context of institutional ECE.

What I mean by this is that research is never context free, and research tasks, such as data collection, should be designed in a manner that acknowledges and respects the characteristics of the context. Children's right to play, to learn by playing, and to enjoy what they have learned is emphasized by the United Nations' Convention of the Rights of the Child (1989), which has influenced various national and international ECE curriculums (Pramling Samuelsson and Johansson, 2006). Indeed, play has been highlighted as the most important pedagogical medium in ECE (Edwards, 2013), and play and learning have even been referred to as "inseparable dimensions of preschool practice" (Pramling Samuelsson and Johansson, 2006: 47). Play is one of the key characteristics in the National Association for the Education of

Young Children's (NAEYC, 2009: 14) influential framework of Developmentally Appropriate Practices. In the Finnish National Curriculum Guidelines, the word "play" is mentioned 102 times (FNAE, 2018). To conclude, it would be justified to say that play is one of the leading concepts in contemporary ECE (See Chapter 1 for more on play).

Although references to play are common in curricular texts as well as in the everyday language of ECE, it is at the same time an extremely ambiguous phenomenon (Sutton-Smith, 1997); and, as such, has been theorized and defined in various and even contradicting ways in extant research literature (Pyle and Danniels, 2017). There are some commonalities, however. One of them is freedom. In their classical and canonized definitions of play, Huizinga (1949) and Caillois (1961) argued that play is free from goals other than those created by the play itself. Accordingly, children tend to consider the freedom from outside demands as one of the fundamental characteristics of play (Wong et al., 2011).

The strong emphasis on the autarky of play provides an interesting perspective on the theme of this book, research through play. What I mean by this is, if play is being used as a research method, the activity we refer to as play is not free from outside demands, as every research process has its own objectives. Thus, if we are to believe Huizinga and Caillois, what we call play would not be play at all. Actually, since education is always an intentional and goal-oriented activity (Siljander, 2002), the very same thing could be said about practically every single thing done in ECE settings. Teachers' intentions are present, even in the play forms we typically refer to as free play. An illustrative example would be that teachers allow children free play time so that they can learn how to get along with others and socialize appropriately (Pyle and Danniels, 2017: 279).

That being said, it is evident that a straightforward and binary division between play and non-play is counterproductive, as it leaves practitioners and researchers without interpretative tools to discover and understand the multifaceted nature of play. First, it is important to acknowledge that a theory-driven (deductive) approach to define and understand play is just one possible starting point among others. For example, from a phenomenological point of view, it is not the theory (nor the type of activity) but the individual's experience that determines whether s/he is playing or not (Rasmussen, 2001). Indeed, the research on children's views on play is full of contradicting accounts of whether engaging in certain activities—for example, drawing and building with blocks—would be considered playing or not (Ólafsdóttir and Einarsdóttir, 2019; Wu, 2014). These contradictions are partially explained by situational factors, and instead of focusing solely to the type of activity, all activities should always be interpreted with an understanding of the broader situation. While children can conceptualize guided drawing as (pre)school work instead of play (Theobald et al., 2015), drawing can also take place within a broader framework of socio-dramatic, dramatic, or fantasy play (Kukkonen and Chang-Kredl, 2018) as a child can, for example, draw in an imagined role other than her real self. Actually, a child can also draw in an imagined role *during* a guided drawing activity, which further underlines the ambiguity of play.

Talking about imagination, it needs to be borne in mind that even if we opt for a theory-driven approach to understanding play, freedom from outside goals is not the only thing that defines what is counted as play and what is not. The possibility to immerse oneself in imaginative realities and situations is included in Huizinga's (1948) and Caillois' (1961) play definitions as well as in Vygotski's (1978) theoretical ideas on play. The fundamental question then is should

an activity that is imaginative but not free from outside goals be understood as play or as non-play? Once again, a binary view is restrictive and counterproductive, and I find concepts such as play-based learning/pedagogy and playful learning/pedagogy extremely useful for solving this dilemma. To me, play and non-play are endings of a continuum rather than distinct categories. Playfulness, in turn, refers to the gray area between these two absolutes (see Figure 1).

Figure 1. Playful activities as the gray area between non-play and play.

In other words, play-based learning/pedagogy and playful learning/pedagogy convey an idea that despite all requirements and principles of pure play—which may not be met in full in the context of education and research—there are still various aspects that locate the activity closer to the play end of the play–non-play continuum. In the following sections, I will explain what this means in the context of our project: I will start with an overview of the project and then focus on the different ways in which playful activities were included and used in the methods employed.

Overview of the project objectives

In this section, the research objectives and outline the phases of the actual research process are discussed. As mentioned in the beginning of the chapter, the overarching theme of the project was digital literacy; specifically, it is about children’s understanding of ubiquitous computing (ubicomp) and the Internet of Things (IoT). The term ubicomp refers to the proliferation of computing in the physical world (Abowd and Mynatt, 2000). In other words, the core idea of ubicomp is that any tangible object can either include or be a computer. The idea behind IoT, in turn, is that any *thing* or object that is appropriately tagged can communicate through an Internet-like structure with other objects that are similarly tagged (Espada et al., 2011). Put differently, when appropriately tagged, any tangible object can include Internet connectivity.

The first research objective was to explore children’s initial perceptions of ubicomp and the IoT. Ubicomp and IoT are a timely topic of study, as these technologies shape children’s digital landscape and lifeworlds, for example, in the form of computer and/or Internet-enabled tangible toys (Statista, 2019). Nevertheless, empirical research on children’s perceptions of these technologies has been practically non-existent, with the exception of Manches et al. (2015), who studied how cognizant 10- to 11-year-old children are of IoT toys. As no studies have been conducted with younger children, there was a clear gap in the knowledge, which our study was designed to fill.

The second research objective was to design and test playful methods to teach children about ubicomp and IoT. The importance of supporting young children’s digital literacy has been addressed by various stakeholders, including scholars (Marsh, 2017); global agents, such as the Organisation for Economic Co-operation and Development (Taguma et al., 2013); and

national educational administrations, such as the Finnish National Agency for Education (FNAE, 2018). Play and digital technologies are seldomly integrated in curriculum texts (Edwards, 2013) and the pedagogics of early years digital literacies education are still in emerging stage (Edwards et al., 2018b; Salomaa and Mertala, 2019). Thus, there is an urgent need for research-based methods that acknowledges the pedagogical principles of ECE, including play.

Since this chapter focuses on the guiding principles behind the playful study design, it does not go into details on the results, which were reported in another publication (Mertala, 2020a). However, to give a brief overview, the children were initially skeptical about the idea that tangible objects, such as plush toys, could be computer and/or Internet enabled. These perceptions changed when the scientific concept of computers and the Internet were provided.

Overview of the project activities

The research project was conducted in a Finnish early childhood center in December 2018 by the author and a group of first year ECE student teachers who were participating in a compulsory course about technology-enhanced teaching and learning. The activities undertaken during the project were designed to acknowledge the pedagogical principles of Finnish ECE outlined in the National Core Curriculum (FNAE, 2018) and to familiarize the student teachers with the transversal model of supporting digital literacies in ECE (Mertala, 2020b). The model consists of three orientations: technology education (i.e., teaching children about how technologies work), media education (i.e., teaching children about critical media literacy), and technology enhanced learning (i.e., using technology to support learning processes). The structure of the three-day project and its linkages to the orientations is summarized in Figure 2 and is followed by a detailed outline of the activities undertaken on each of the three days.

Figure 2. Structure of the project and its linkages to the three orientations of the transversal model of supporting young children's digital literacies

Day 1

On the first day, the children's initial conceptions were explored by having them freely explain what they knew and understood about computers and the Internet. This decision reflected the sociocultural tradition of Finnish ECE that puts emphasis on children's initial knowledge of and prior experiences (FNAE, 2018: 22). There were, indeed, variations in children's initial perceptions. While many children found it difficult to verbalize what computers and the Internet are, they were able to tell what can be done with them, a notion familiar from previous research (Edwards et al., 2018a; Mertala, 2019). However, one child explained that computers are built from different types of parts. His knowledge had strong sociocultural roots, as he related that he knew this because his grandfather had different types of computer parts.

Then, the children were shown pictures of a car, washing machine, and teddy bear one by one and asked whether these objects could include a computer or an Internet connection. These specific items were chosen because they present a pool of everyday objects that are likely to be familiar to all children. All these objects can also contain computers and connectivity. For example, all modern cars have at least one computer in them and many have integrated on-board computers that can display error signals and/or be used for navigation purposes.

After this, a short scientific explanation of computers and the Internet were introduced to the children by reading selected parts of non-fiction children's books *Miten tietokone toimii?* Kurkista ja Koodaa [Flip-the-flap: computers and coding; (Dickins and Nielsen, 2015)] and *Miten Internet toimii* [How the Internet works; (Nilsson, 2015)]. Next, the children were shown the same three pictures again, and they were asked whether the objects could contain a computer or an Internet connection. Finally, the children were asked to draw the design of a toy that would have computer or connectivity in it. The children were oriented for the task through a fairy tale about a Christmas elf who hit her/his head on a tree in a sledging accident and was therefore unable to invent any new toys for the coming Christmas and needed help from the children. During and after the drawing, the children were interviewed about the design by asking, for instance, how the toy could be played with and what would connectivity/computer do in the toy.

Days 2 and 3

On the second day, the drawings made during the first day were reexamined with the children by reading to them what they had told about their design and by giving them an opportunity to refine the design. When the children were happy with the design, they began to build prototypes of their designs by using all the materials available in the center (e.g., toys, cardboard, Play-Doh, etc.). The children were given an opportunity to use battery-operated light-emitting diode (LED) lights to signal the presence of digitality and electricity. Digital photos of the prototypes were taken for use on Day 3, which was devoted to composing print advertisements for the toys. When the prototypes were ready, the children were able to play with them. Pedagogy-wise, the idea of building concrete prototypes was catalyzed by various sources. Working with physical materials to understand the digital world was inspired by Dufva and Dufva's (2019) ideas of "digi-grasping," that is, holistic and embodied sense-making in and of the world where the digital and physical worlds are deeply intertwined. Other sources of inspiration were the tactile tradition of ECE (Parker and Neurhart-Prichett, 2006) and the general principles of technology education: One goal of technology education is to teach

children that technology is always an outcome of human activity and creation of own technological products is named as one method for achieving this object (FNAE, 2018: 47).

On the third day, the digital photos of the prototypes were printed. Then, the children were invited to compose print advertisements for their toys. A collage technique combining drawing, writing, cutting, and gluing pieces from actual ads was used. The orientation of this activity was media education and to engage children in the investigation of semiotic resources used in print advertisement, such as boldface capital letters, exclamation marks, bright colors, smiling people, etc. The activity was guided by the Finnish National Core Curriculum that requires an educator to support children's critical media literacy, and the playful creation of own media texts is mentioned as a pedagogically appropriate method (FNAE, 2018: 45).

Playful elements of the project

Three different kinds of playful activities can be identified from the project: 1) imaginative framing, 2) playing around with materials, and 3) "free" play with self-designed toys. Figure 3 illustrates where these activities fit in relation to each other in the continuum of play. Each of the aforementioned themes are elaborated in the following sections.

Figure 3. Playful activities of the project in the continuum of play

Imaginative framing

Imaginative situations were present in our research process in several ways and on several levels. Actually, the whole process of designing and building ubicomp and IoT toys was framed via an imaginative situation. As previously mentioned, the activity of toy design was introduced to the children in the form a short story. The full story went as follows:

Did you know that all the elves in Santa's village have specific responsibilities? Lekolar Playful, for example, is one of the oldest and most respected elves, and their task is to design new toys. Lekolar is extremely proud that for centuries, she/he has come up with wonderful new inventions for Christmas. However, this year, all that has changed. Despite their age, Lekolar loves sledding. Unfortunately, while racing down a steep slope at a furious pace, Lekolar lost control of the sledge and hit their head on a tree. As a result of the shock, Lekolar has been unable to create any new ideas for toys. Mixture Meiram, the doctor elf, is sure that Lekolar will return to normal, but this will not happen in time for Christmas. Now Santa needs help from skillful and creative children like you. Your task will be to design new types of toys—toys that have a computer inside them and can also be connected to the Internet.

The idea behind the use of imaginative framing is that children are not just merely asked to draw a design; playful fantasy elements are included in the task. In other words, the children are not drawing the designs and building the prototypes only because they have been instructed to do so—an activity that would be approached as non-play by many children (Brooker, 2014) and play theorists (Pyle and Danniels, 2017). Instead, they are provided a playful fantasy narrative to give the task a purpose—helping the poor elf—and to stimulate their creativity. From a pedagogical point of view, methods like these can be interpreted as a playful learning approach in which the learning of targeted skills will occur in a manner that is playful, engaging, and enjoyable for the children (Pyle and Danniels, 2017).

Playing around with materials

Playing around with materials can be initially located in the non-play end of the continuum. As noted by Brooker (2014), children often view activities with specific outcomes as non-play, and it is certainly true that explicit instructions were included in this project. The children were asked to draw the design of a toy, build a tangible prototype of the toy, and compose an advertisement for the toy. Additionally, some of the materials used (e.g., LED lights and print advertisements) were offered to the children by us instead of giving them a total freedom of choice. While the instructions to use these particular materials to design predefined artifacts may appear contradictory in relation to the autarky of play, they, at the same time, served an important communicative purpose—objects and artifacts can act as mediating tools that allow different parties to understand each other's thinking by creating a transitional space in which their thoughts and ideas can be externalized into concrete form (Lipponen et al., 2016). It can also be argued that such tools are needed, especially when addressing phenomena as abstract and complex as the ubicomp and IoT, as they allowed us to approach the digital world through the physical world (see also Dufva & Dufva, 2019). For instance, the children were able to illustrate and concretize the location of the computer in their toys by pointing to the exact area in their drawings and/or prototypes instead of merely stating that there would be a computer somewhere.

Furthermore, while the tasks were not totally free or open, there was a great sense of freedom regarding the kinds of toys the children were able to draw and build. The variation in children's ideas and creations is perhaps best illustrated by looking at the actual prototypes. Figure 4 provides some examples of the various ways the children employed different materials in their designs. The toy shown on the far left is a moving dollhouse made from Lego bricks, Play-Doh, and LED lights. The upper right image is a super robot (which shoots laser beams from its legs) made out of Play-Doh, plastic beads, and LED lights. The lower right image is a prototype of a smartphone-operated concrete truck with LED lights tied on (the arrow points to the lights). The lower. Since the concrete truck was not remote-controlled nor was the robot actually able to shoot lasers from its legs, imaginative framing was present in the playful use of materials.

Figure 4. Smart toy prototypes made from different materials.

“Free” play with self-designed toys

The third and final form of playful activity was “free” play with the self-designed toys. The term *free* here indicates that the children’s play activities were not guided or instructed at this stage. Quotation marks around the term are thus used to pinpoint that in the context of institutional education, teachers’ intentions are present even in child-initiated activities. In our case, the inclusion of the “free” play period was influenced by the Finnish core curriculum, which states that “while playing, children have an opportunity to use their imagination and creativity, try out their ideas and explore the world,” which supports their thinking and learning skills (FNAE, 2018: 24). We believed that playing with the self-made prototypes would be a novel experience for the children. Thus, it would provide new elements to the children’s play, which again would contribute positively to their learning and development. While it is impossible (and needless, I would add) to point out any explicit learning outcomes from the “free” play period, its inclusion in the project is justified by the observation that the children seemed to enjoy the opportunity to play with the prototypes. In the end, it is the children and their happiness and wellbeing that matters the most.

Concluding remarks

This chapter has presented a research project in which 3- to 6-year-old Finnish children’s digital literacies were studied and supported via playful methods. The first key thesis of the chapter was that research processes should be designed with respect to the characteristics of the research context, and the chapter has demonstrated that research projects conducted in ECE can be playful as well as pedagogical (which here refers to contributing to children’s learning). The second key thesis was that the ambiguity of play should be acknowledged when planning, conducting, and evaluating playful research projects. In this chapter, I problematized the idea of totally free play in the context of education and/or research and suggested that the concept of playfulness better captures the multifaceted nature of play. The third and final thesis was that studying and supporting children’s digital literacies does not always require digital devices. To support this claim, this chapter provided practical examples of how children’s understanding of ubicomp and IoT were studied and supported by using printed books, Play-Doh, and traditional toys. That being said, these practices should not be approached as a one-

size-fits-all solution, as the pedagogical value and meaningfulness of playful projects are always highly contextual.

Further reading

- Caillois R (1961) *Man, Play and Games*. New York, NY: Free Press of Clencoe.
- Edwards S, Mantilla A, Henderson M, Nolan A, Skouteris H and Plowman L (2018a) Teacher practices for building young children's concepts of the Internet through play-based learning. *Educational Practice and Theory* 40(1): 29–50.
- Huizinga J (1949) *Homo Ludens: A Study of the Play-Element in Culture*. London, UK: Routledge
- Mertala P (2020a) Young children's perceptions of ubiquitous computing and the Internet of Things. *British Journal of Educational Technology* 51(1): 84–102.

References

- Abowd GD and Mynatt ED (2000) Charting past, present, and future research in ubiquitous computing. *ACM Transactions on Computer-Human Interaction* 7(1): 29–58.
- Brooker L (2014) Children's perspectives on play. In: Brooker L, Blaise M and Edwards S (eds) *The Sage Handbook of Play and Learning in Early Childhood*. Thousand Oaks, CA: Sage, pp. 319–329.
- Caillois R (1961) *Man, Play and Games*. New York, NY: Free Press of Clencoe.
- Dickins, P and Nielsen, S (2015) *Kuinka tietokone toimii? Kurkista ja Koodaa*. Helsinki, Finland: Tammi.
- Dufva T and Dufva M (2019) Grasping the future of the digital society. *Futures* 107: 17–28.
- Edwards S (2013) Digital play in the early years: a contextual response to the problem of integrating technologies and play-based pedagogies in the early childhood curriculum. *European Early Childhood Education Research Journal* 21(2): 199–212.
- Edwards S, Mantilla A, Henderson M, Nolan A, Skouteris H and Plowman L (2018a) Teacher practices for building young children's concepts of the Internet through play-based learning. *Educational Practice and Theory* 40(1): 29–50.
- Edwards S, Nolan A, Henderson M, Mantilla A, Plowman L and Skouteris H (2018b) Young children's everyday concepts of the Internet: a platform for cyber-safety education in the early years. *British Journal of Educational Technology* 49(1): 45–55.
- Espada JP, Martínez OS, Lovelle JMC, G-Bustelo BCP, Álvarez MÁ and García AG (2011) Modeling architecture for collaborative virtual objects based on services. *Journal of Network and Computer Applications* 34(5): 1634–1647.
- Finnish National Agency for Education (2018) *National core curriculum for early childhood education and care 2016*. Regulations and guidelines 3a. Helsinki, Finland: Finnish National Agency for Education
- Huizinga J (1949) *Homo Ludens: A Study of the Play-Element in Culture*. London, UK: Routledge.
- Lipponen L, Rajala A, Hilppö J and Paananen M (2016) Exploring the foundations of visual methods used in research with children. *European Early Childhood Research Journal* 24(6): 936–946

- Kukkonen T and Chang-Kredl S (2018) Drawing as social play: Shared meaning-making in young children's collective drawing activities. *International Journal of Art & Design Education* 37(1): 74–87.
- Manches A, Duncan P, Plowman L and Sabeti S (2015) Three questions about the Internet of Things and children. *TechTrends*, 59(1): 76–83.
- Marsh J (2017) Introduction. In: Marsh et al. (Eds) *Makerspaces in the Early Years: A Literature Review* pp. 6–11. MakeY. Available at: http://makeyproject.eu/wp-content/uploads/2017/02/Makey_Literature_Review.pdf (accessed 24 September 2019).
- Mertala P (2019) Young children's conceptions of computers, code, and the Internet. *International Journal of Child-Computer Interaction* 19: 56–66.
- Mertala P (2020a) Young children's perceptions of ubiquitous computing and the Internet of Things. *British Journal of Educational Technology* 51(1): 84–102.
- Mertala P (2020b) Laaja-alaisen tieto- ja viestintäteknologisen osaamisen tukeminen varhaiskasvatuksessa ja esiopetuksessa. *Journal of Early Childhood Education Research*. In press.
- Mertala P and Meriläinen M (2019) The best game in the world: exploring young children's digital game-related meaning-making via design activity. *Global Studies of Childhood* 9(4): 275–289.
- Nilsson, H (2015). *Miten Internet toimii*. Helsinki, Finland: Kansallinen audiovisuaalinen instituutti.
- Ólafsdóttir SM and Einarsdóttir J (2017) "Drawing and playing are not the same": children's views on their activities in Icelandic preschools. *Early Years* 39(1): 51–63.
- Parker A and Neuharth-Pritchett S (2006) Developmentally appropriate practice in kindergarten: factors shaping teacher beliefs and practice. *Journal of Research in Childhood Education* 21(1): 65–78.
- Pramling Samuelsson I and Johansson E (2006) Play and learning—inseparable dimensions in preschool practice. *Early Child Development and Care* 176(1): 47–65.
- Pyle A and Danniels E (2017) A continuum of play-based learning: the role of the teacher in play-based pedagogy and the fear of hijacking play. *Early Education and Development* 28(3): 274–289.
- Rasmussen TH (2001) *Legetøjets virtuelle verden: Essays om legetøj og leg*. Brøndby, Denmark: Semi-forlaget.
- Salomaa S and Mertala P (2019) An education-centred approach to digital media education. In: Gray C and Palaologou I (eds) *Early Learning in the Digital Age*. Thousand Oaks, CA: Sage, pp. 151–164.
- Siljander P (2002) *Systemaattinen johdatus kasvatustieteeseen*. Helsinki, Finland: Otava.
- Statista (2019) Smart toys industry revenue worldwide in 2013 to 2020 (in billion euros). Available at: <https://www.statista.com/statistics/320941/smart-toys-revenue/> (accessed September 24 2019).
- Sutton-Smith B (1997) *The Ambiguity of Play*. Boston, MA: Harvard University Press.
- Taguma M, Makowiecki K and Litjens I (2013) *Quality Matters in Early Childhood Education and Care*. Norway. OECD
- Theobald M, Danby S, Einarsdóttir J, Bourne J, Jones D, Ross S, Knaggs H and Carter-Jones C (2015) Children's perspectives of play and learning for educational practice. *Education Science* 5: 345–362.
- The United Nations Convention on the Rights of the Child (1989) available at: <https://downloads.unicef.org.uk/wp->

content/uploads/2010/05/UNCRC_united_nations_convention_on_the_rights_of_the_c
hild.pdf?_ga=2.29501631.1869895547.1569312281-119588749.1566211220
(accessed 24 September 2019).

- Vygotsky L (1978) *Mind in Society: The Development of Higher Psychological Processes*. Boston, MA: Harvard University Press.
- Wong S, Wang Z and Cheng D (2011) A play-based curriculum: Hong Kong children's perceptions of play and non-play. *The International Journal of Learning* 17(10): 165–180.
- Wu S-C (2014) Practical and conceptual aspects of children's play in Hong Kong and German kindergartens. *Early Years* 34(1): 49–66.