

Perspectives in Cultural-Historical Research 13

Marilyn Flear · Glykeria Fragkiadaki ·
Elin Eriksen Ødegaard · Prabhat Rai ·
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Editors

Cultural-historical Digital Methodology in Early Childhood Settings

In Times of Change, Innovation and
Resilience

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Perspectives in Cultural-Historical Research

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There is growing interest in the work of LS Vygotsky internationally, but also in finding new ways and perspectives for advancing cultural-historical theory for solving contemporary problems. Although Vygotsky has become one of the most influential scholars in education and psychology today, there is still a need for serious studies of his work because so much remains unexamined.

The books in this series draw on the collected works of Vygotsky as a primary source of authority. They go beyond secondary sources and discuss Vygotsky's original ideas in the context of a system of concepts or through the elaboration and theorisation of research findings so that contemporary problems can be addressed in new ways.

This series collectively brings together under one umbrella a more equal representation of works from scholars across both the Northern and Southern continents. In the context of a large volume of contributions to cultural-historical theorisation and the empirical work from North America, there is an urgent need for making visible the works of scholars from countries who reside in countries other than North America.


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Chapter 1

Cultural-Historical Digital Methodologies: The Dialectics of Crisis and Research Innovation



Elin Eriksen Ødegaard , Marilyn Fleer , Glykeria Fragkiadaki ,
Alicja Sadownik , and Prabhat Rai 

Abstract This book brings forward concepts to support a cultural-historical digital methodology. Specifically, this chapter draws on the dialectics of crisis to articulate a series of research innovations that are presented throughout the book. The chapter outlines the theorising of the methods, and discusses the concepts of e-motion, cultural-historical loop model and builds on the legacy of a wholeness approach to elaborate how the original concepts introduced by Mariane Hedegaard work in digital contexts. Crisis as a dialectical relation between an everyday and scientific reading are foregrounded in this chapter, and through this lens the chapter presents a scholarly contribution across the three broad principles of dialectics, historicity, and cultural-historical practice-centred science in times of crisis.

Keywords Crises · Dialectics · e-motion · Cultural-historical loop model · Wholeness approach

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1.1 Introduction

This book aims to bring forward new methods and methodologies to support researchers working in a cultural-historical tradition. We suggest that it is not the ‘method’ per se, but rather the focus is on how to create the conditions that allow researchers to better understand dynamic and changing realities being faced in times of crisis. Vygotsky (1997) suggested:

The method must be adequate to the subject studied ... Knowing the uniqueness and deliberately beginning the research from this point is the first condition for adequacy of the method and the problem; for this reason, the problem of method is the beginning and the foundation, the alpha and the omega of the whole history of the cultural development of the child. (p. 27)

To achieve the goal of this book, we show how new methods have acted in the service of new research needs brought about by a global pandemic. However, this is not the only kind of crisis to bring new concepts into our research tradition. We suggest that many kinds of crises co-exist, such as the globally felt conflicts and devastation of war and the climate emergency, where extremes in weather are creating localised flooding, drought, and economic deprivation. We also acknowledge the predicted crises of future pandemics that remain on the horizon and that will impact the work of researchers.

In this book, the scientific concept of crisis and the everyday lived experience of crisis are in dialectical relations with each other. This dynamic has been grouped in this book under five sections, showing how the work of researchers across the community, families, and the profession has to be realised in new ways. By making the relations between the scientific and everyday readings of crises visible, the researchers have been able to consciously realise new research conditions and to theorise a new dynamic interplay when solving problems associated with human needs.

As editors, we recognise that a crisis is viewed scientifically as a source of development for the researcher. However, it is also a painful time for the research participants and the everyday life circumstances of families and communities, more broadly, who are engaged in the field of early childhood. Therefore, this book also brings forward the new concept of *dis-situation of development* (Sect. 1.4). This concept seeks to capture the idea that whilst it is known that not all crises are developmental, in the context of this book, researchers and research participants in times of crisis experience new social situations. Therefore, their existing social situation of development must be conceptualised differently.

In this book, the collective efforts of the researchers are introduced and theorised under five themes as new concepts to inform researchers, and these are symbolic of the disrupted practices that generated new ways of researching. The chapter concludes with a digital research model that brings together the theorising of the methods in the chapters of case studies that follow across the five sections of the book and which support our dialectical model of research.

1.2 Concepts to Inform Research in Times of Crisis

In this section, we introduce each of the five concepts that have emerged from a synthesis of the content of this book.

Theme 1: Dialectics

Crisis is not a contemporary concept or an unprecedented experience in the history of the development of human personality. It is the *sine qua non* of being and becoming. Historically, ‘People in various parts of the globe in different moments of their life have to deal with various forms of crises (environmental crisis, public health crisis, socio-economic crisis, psychological crisis, educational crisis, etc.)’ (Dafermos, 2022, pp. 1–2). The transformative nature of the COVID-19 pandemic brought this realisation forward in our everyday lives as an everyday phenomenon in a tangible and catalytic way. In parallel, the scientific concept of crisis became central in our research trajectories as a means to reflect on, understand, and change the new reality.

This book is not about the pandemic. It is a book that discusses how researchers reflect on their ever-changing and contradictory worlds and develop concepts and methods to respond to new societal needs, meet emerging demands, and understand reality in motion. One of the anchoring principles that we work with as part of bringing out new methods and methodologies for researching early childhood is how theory must change and develop in relation to the context, conditions, and the historical moment in which researchers are working. With the critical experience of the global pandemic behind us, we intend to employ the dialectical understanding of crisis in cultural-historical theory (Dafermos, 2022) to reflect on diverse contexts of early childhood education. With a global pandemic as an illustration, this book captures a historical moment in time that brings forward the dialectical aspect of the concept of crisis and shows how theory and methodologies can inspire and change in relation to new demands and conditions in an unprecedented time. Historically, the global pandemic is one moment in a long line of many in which our theoretical reflections were challenged and developed. Historical examples, such as the development of Vygotsky’s theorisations during the times of the Russian empire collapse, the October revolution, and the emergence of the Soviet Union, as well as contemporary examples, such as the development of Mariane Hedegaard’s model (1999, 20,014) about a wholeness model to children’s development, where she acknowledges that focusing on the child’s perspective gave a too narrow conception of children’s development and therefore introduces societal conditions, and institutional practices giving demands that propelled a child’s development in her/his own learning and development, are indicative of socially and culturally determined turning points in history and in theory.

As Dafermos argues (2015), ‘Dialectics as a way of thinking focuses on the study of each concrete object in its mutual connections with other objects, in its internal contradictions and in its process of change.’ However, in the historical moment that we, as researchers and as whole personalities, live through, the mutual connections in most cases have been loosened, interrupted, and reconnected in new

ways; contradictions have taken over and changes are rapid and come in quick succession. The ideal form of research as we know it has been disrupted and challenged. For example, the mature form of an educational experiment, as originally enacted in practice and theorised as a collaboration on a theoretical problem, has had to be re-imagined (see Sect. 1.1). Within this framework, our understanding of the child's world had been dis-situated and decontextualised. Using a dialectical lens allows us to search for new and complex connections and catch a new thread of interrelations, synthesise, and theorise them in a meaningful new way (see Sect. 1.2). Here, dialectics capture the unity between the personal and interpersonal, the intra- psychological and inter-psychological, materialism and idealism, continuity and discontinuity in times of crisis leading us to 'islands of safety in the Heraclitean stream' (Vygotsky, Vol. 3, p. 274). Through the model presented at the end of this introductory chapter and the five sections of this book, we map the current 'islands of safety' that dialectics have raised for us in terms of theory, methodology, and practice.

Theme 2: Navigating the Crisis Through New Knowledge Production

Like many cultural studies born from dialectics, models of research into children's development, such as that of Hedegaard, are being challenged as researchers work under the new conditions of not being able to be in person at the research site. We find through our synthesis of the practices of the researchers described in the different chapters of this book that Hedegaard's model is sensitive to historical change.

We are inspired by the model that Hedegaard developed and re-developed over time. This is indicative of how theory continues to evolve as societal conditions and research needs change. The qualitative methodology is constantly evolving, and crisis situations can easily propel a change in approach as new conditions set off or accelerate new demands and motives. This can be better understood in the context of the powerful critique of Vygotsky (1997) on traditional methods of research, which he said were static, captured only solidified development, and were not subject to historical transformation:

These techniques or methods of behavior, arising stereotypically in given situations represent virtual solidified, petrified, crystallized psychological forms that arose in remote times. (p. 39)

Traditional methods become expected by journal editors and reviewers, in presentations and in the justifications of researchers. They are survivors of latent approaches for the study of human needs and practices, which Vygotsky (1997) suggested were 'weathered, historical scraps which have lost their [original] meaning, these psychological survivors of a remote past enter into the common tissue of [researcher] behavior in an alien body, so atypical, impersonal, having lost almost all meaning' (p. 40). It is an important legacy of Vygotsky that concepts and theory are tools for thinking, as also recognised in Wartofsky's work on artefacts and models (Wartofsky, 1979/1966). Wartofsky warns about a crude and naive realism when it comes to the concept of representation or to copy theory: 'The tactic then is to enrich the concept of representation in such a way that it can accommodate a fairly sophisticated range of scientific models' (Wartofsky, 1979/1966, p. 1). Concepts are tested and refined

in their use, which in turn adds to new ways of approaching participants. In this way, research innovation evolves and changes methodology and knowledge.

Whilst there exists a critique of research methodologies based on Vygotsky, namely that the emphasis on the collective can put the research design at risk of ignoring the voice of the individuals involved, contemporary researchers and methods, such as Hedegaard's innovative and renowned model of child development, encompass institutional practices from a cultural-historical perspective and give attention to individuals as well as the collective. Culture, development, and how we communicate are inextricably linked, just as a person's understanding of a given activity, event, or utterance is conditional upon the situational cultural history.

Hedegaard theorised child development at a time when the field of developmental psychology was driven by ambitions of creating universal models and indicators of cognitive and behavioural development. By challenging the hegemony of laboratory-based experiments with observations conducted in the children's daily settings, she became a new and radical voice in developmental psychology. Building on Vygotsky's dialectical ontology stemming from the Marxist perspective that explains development as happening in a meshing of an ideal and material form, she developed a theory that contextualised the child's development in interpersonal, institutional, and socio-cultural settings.

Significantly, these new theorisations and ways of bringing forward societal, institutional, and personal perspectives as realised through the dominating demands and motives were developed in contemporary times. Hedegaard's model was originally developed in 1999. It was first published in relation to the problem of immigrants having to relate to different values in different institutions, such as those of family and school (Hedegaard, 1999).

Hedegaard's work can evidently be traced to a Vygotskian, cultural-historical approach to learning and development (Edwards et al., 2019). However, she also engages in dialogues with contemporary scholars who study children and childhoods in social life conditions. She contextualises various conditions for understanding children, childhood, and the impact of everyday lives, such as studies of children's developmental trajectories and transitions in relation to families and professionals (Hedegaard et al., 2012). She develops her designs and modelling in dialogue with contemporary theorisations. As an alternative to the dominant school readiness approach across the globe, she points to the new tendencies found in the Nordic countries, where especially the governments in Denmark and Norway have recently formulated frameworks that conceptualise person formation in a wholeness approach and where children's explorative activities are highlighted (Hedegaard & Ødegaard, 2020).

The cultural-historical premise in Hedegaard's original 2008 model, used to analyse children's development, assumes relatively stable activity settings. When crises occur, we are reminded of the disruption that emerges or clashes within activity settings and between them, which calls for bringing crises into theorisation.

In line with cultural-historical traditions, following Vygotsky's legacy and the recognition that concepts are tools that enable us to work, Hedegaard's ideas have not only been literally applied in diverse settings around the world but they have

also been nuanced and developed by other researchers as they create new designs for new and local problems and analyse their empirical data.

In Hedegaard’s model from 2012, it is evident that Vygotsky’s work grounds the modelling of her ‘wholeness approach’, but not solely. She is also in dialogue with and inspired by Elkonin, Bruner, and Rogoff’s work, to name a few (Hedegaard, 2012) (Fig. 1.1).

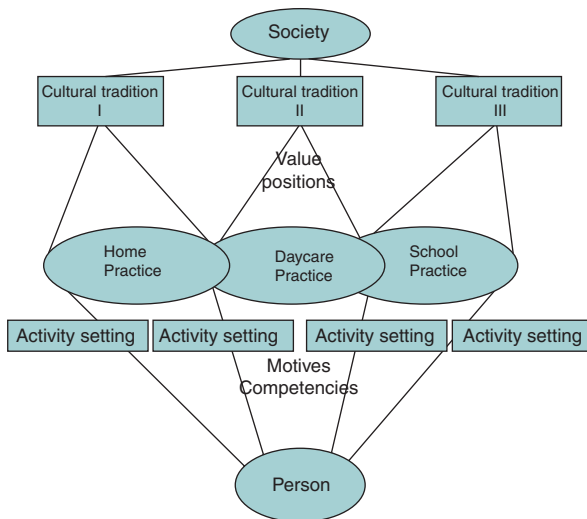
The dialectic relation between social demands (society) and the child’s motives (person) constitutes an important dynamic in the model. This line of cultural-historical tradition of psychology sees the child’s development as trajectories through institutional practices. The model supports analyses of children’s development with the premise that every point can be localised in relation to the child’s social situation. As articulated in a recent tribute to Hedegaard’s legacy:

This approach encourages us to try to understand the child as she or he engages with the demands and opportunities for action in activities that occur within institutional practices, which are themselves embedded in local and national histories and societal expectations (Edwards et al., 2019, p. 2).

The model visualises three overlapping streams of cultural traditions: home, school, and daycare (including varieties of early childhood settings, such as preschool and kindergarten).

This analytical approach, stemming from Hedegaard’s models, enables the researcher to problematise time as change and continuity, as developmental trajectories, and as transitions. The concept of ‘activity setting’ is central in the model and helpful for designing methodologies for early childhood educational settings and beyond, as ‘activity settings’ can be any everyday scene or event that will unfold in time and be situated in a local place. Activity settings are recurring events located in practices. These practices are based on traditions in a society’s different institutions.

Fig. 1.1 Hedegaard’s model of Wholeness Approach to children’s development (2012)



Later, Hedegaard included human biology in her model to further theorise the nature of child development from a cultural-historical perspective (e.g. Hedegaard & Ødegaard, 2020). In our understanding, human biology entails wider cultural-historical interdisciplinary knowledge areas such as genetics, evolution, physiology, anatomy, epidemiology, anthropology, ecology, nutrition, population genetics, and the interplay of these. In adding human biology as a concept in the theorisations, Hedegaard opens up the way for understanding children, childhood, and institutional practices as more than cultures alone, and this is interesting from the perspective of crises. As we know, crises can encompass epidemics, a lack of nutrition, genetic variations in individuals as well as in populations, unexpected ecological disasters, and other unforeseen events.

This example of Hedegaard's transformation of her own model is suggestive that theories are not static self-contained systems of thought but are always in motion and always being transformed in relation to the local and societal conditions and to the research questions targeted. We suggest that the international context of the global pandemic and its associated crises for researchers and research participants also acted as a catalyst for the transformation of her model, as will be shown later in this chapter.

Therefore, we posit that the anchoring principle of the emergent models, methods, and methodologies will continue to change, as reflected in the evolution of the model of child development in contemporary times by cultural-historical theorists such as Hedegaard and those who have contributed to this book.

Theme 3: Hologram

The concept of the hologram comes into the picture in Sect. 1.4 as growing from the dialectics of crisis experiences and the process of *innovating out* of these through conceiving new activity settings for institutional practices. The hologram, then, is a response to the demand for continuation of academic practices from the isolation of individuals' homes. As the essence of the hologram is an 'apparent dematerialisation' (Johnston, 2017, p. 494), we use this concept to capture the transfer of institutional activity settings to a cyber space extending beyond the campuses and homes. The hologram is also a way in which academic institutions respond to the expectations of particular historical moments.

The hologram of the university comprises digital rooms, break-out rooms, and platforms entered by researchers, lecturers, and students instead of offices, classrooms, and meeting rooms. Such a 'dematerialisation' depends strongly on the technological materiality being activated both on the university servers and at the individuals' homes. Apart from the technological aspect of 'freezing light interference' (Johnston, 2017, p. 495), the hologram is also related to a joint intersubjectivity, a common imaginary space, where it is possible to participate and collaborate in both synchronous and asynchronous ways. This 'three-dimensional imagery' (Johnston, 2017, p. 493) captures the dialectics of the hologram itself, which is the dialectics between the material and ideal space. Extracted from the physical surroundings of a campus, it gives a sense of an ideal state, while its deep material/technological anchoring flashes out through the digital devices being used to enter

the hologram (dematerialised university). Constituted in the dialectics between the ideal and material, it resembles the object put by Leontyev (2009) as existing ‘in twofold: first, in its independent existence as subordinating to itself and transforming the activity of the subject; second, as an image of the object, as a product of its property of psychological reflection that is realized as an activity of the subject and cannot exist otherwise’ (p. 86).

Through the lens of the hologram concept, it is possible to grasp how the researching for new practices of emergent research and academic teaching unfolds within the dialectical interplay of the material and ideal, as expounded upon in Sect. 1.4. The collaborations in the educational experiment cannot be undertaken in person. Through the digital platforms, a hologram of the relations between researchers and research participants is captured and understood as family–university and child-care–university sites. Collaborations are now virtually enabled.

Theme 4: Crisis: Plurotemporal and In-flux Material Conditions/Activity Settings/Space

Educational and developmental psychology is often criticised for its reliance on universal (spaceless) and ahistorical (timeless) conceptualisations of human development. In stable periods, space and time are generally considered in the background. Time (in terms of age and stage) and space (in terms of cultural and material conditions) are merely referenced to explain development in such a theorisation. This position contrasts with Vygotsky’s ‘genetic historical approach’, where he argues for studying development historically, which ‘means to study it in motion. Precisely this is the basic requirement of the dialectical method’; thus, ‘historical study of behavior is not supplementary or auxiliary to theoretical study but is a basis of the latter’ (Vygotsky, 1997, p. 43). One of the central features of a crisis is that it amplifies the moment (time), and in a crisis of the nature of a global pandemic it also restricts our access to spaces (workplace, school, early learning centres, pre-schools, playgroups, etc.) and forces new ways of using space. In these challenging moments, as Perret-Clermont and Lambolez remark:

It seems that we are prisoners of time and completely powerless when faced with it; we cannot speed it up, slow it down or stop it, much less go backward in it; it imposes its own pace on us, and we cannot change it. (Perret-Clermont & Lambolez, 2005)

A crisis is a critical moment in chronological time distinct from the past, present, and future. It is a time of acceleration, urgency, uncertainty, new demands, and new potentialities and transformation. This temporal distinctiveness also makes a crisis a time of modification and transformation. In the temporal sense, a crisis is ‘a state of greater or lesser permanence, as in longer or shorter transitions towards something better or worse or towards something altogether different’ (Koselleck & Richter, 2006, p. 358). A crisis is a moment marked by uncertainty about the future, a suspension of existing daily routines and habits. Moreover, it is also a moment of heightened emotional response, with the pressure of taking urgent actions even without fully understanding their consequences. It is impossible to plot all these developments in a single stream of time.

Crises also highlight that the relationship between time and space is not unidimensional or linear but pluritemporal. As Perret-Clermont and Lambolez (2005) suggest, following the work of Bruno Latour: ‘Time-space is perceived as enriched by the agency of human beings subtly weaving together interactions from many places, times and types of material’ (p. 9). While challenging the idea of timelessness in Piaget’s theory, Latour (2005) argues that ‘we should not speak of time, space and actant but rather of temporalization, spatialization and actantialization’ (p. 178). He continues with a comment that ‘since these words are horrible to understand’, a more elegantly way of expression this is ‘of timing, spacing, acting’ (p. 178). These ideas resonate with Chaiklin’s (2011) claim that cultural-historical science is directed to the study of human practices (see further below). This is in alignment with the Vygotsky’s own position as he suggested:

The most complex contradictions of psychological methodology are transferred to the grounds of practice and only there can they be solved ... “Method” means “way,” we view it as a means of knowledge acquisition. But in all its points the way is determined by the goal to which it leads. That is why practice reforms the whole methodology of science. (Vygotsky, 1997, p. 306)

There is a discrete departure from the stable period; the crisis brings time and space to the forefront when regarding human development as a legitimate object of inquiry while thinking about practice interventions in educational experiments (as discussed in Sects. 1.1, 1.2, and 1.3). We begin to live in an in-flux/transitional time that is amplified in its experience, emotionally laden with new demands, and seems to move at a different pace marked by changes in routine and ways of living. Therefore, the new research methods presented in this book

... [lay the] foundations for a dialectical view of history as an ongoing fluid and dynamic process that is always here in the present, existing in the unending and ever-expanding dynamic layering of social practices in which the past and the present interpenetrate one another. (Vianna & Stetsenko, 2006, p. 82).

Theme 5: The Drama of Motion and (e)motions: e-motion (Emotions and Digital)

In many of the chapters that present new research methods, emotions are not always foregrounded. Yet, each of the researchers and practitioners has, in one way or another, experienced disturbances at a societal level that have to a lesser or greater extent had an impact on the institutional practices and personal motives of the researchers and research participants. Paying respect to the challenges faced and experienced in times of crisis means giving attention to emotions. We make visible new motives and demands when going digital during a crisis. Emotions constitute a variety of quality, intensity, frequency, course, and expression (Holodynski, 2013). The inner state of emotions is not necessarily consciously realised as a feeling state.

The function of cultural-historical dynamics in emotions and their role in development has been addressed in cultural-historical methodologies as a co-construction of emotions in social relationships (Fleer & Hammer, 2013; Holodynski, 2013). Emotions in this perspective are most often understood in the context of social others. How emotions are fundamentally biologically situated in the body, however, is

not ignored in cultural-historical roots, and it is pointed out as the primary driver of human biology in Hedegaard's latest works (e.g. Hedegaard & Ødegaard, 2020). This is in line with Vygotsky's discussion of the 'dynamogenic effect on emotional excitation' as a basic factor in development. In *Teaching about emotions: Historical-psychological studies* (Vygotsky, 1933/1999), he states that:

... emotions control us from the very beginning of life on earth and increasing intensity of emotions becomes the commanding stimulus for strong movement. Each bodily change that occurs in the internal organs-cessation of digestive processes (which is accompanied by a release of a supply of energy that may be used by other organs), outflow of blood from internal organs whose activity is decreased to organs that participate directly in muscle tension (lungs, heart, central nervous system); strengthening of heart contractions; rapid elimination of muscle fatigue; mobilization of large reserves of sugar that contains energy-each of these internal changes results in a direct benefit, fortifying the organism during great expenditure of energy elicited by fright, pain, or anger. (p. 77)

Such bodily changes stemming from emotional states do not belong to the primary drives of the infant only. It is an inborn human capacity that may serve as an organic preparation for coming tensions and conflicts that potentially arise when confronted with uncertainty and worries, as well as with excitement and engagement, coming to the forefront, for example in digital agility, as pointed out in Part V. One should, however, take into consideration that 'emotions differ and are set apart endlessly, but you will not find any logical generalisations in them' (Vygotsky, 1933/1999, p. 75).

Even if emotions are not elaborated as emotions per se, in the practices referred to in this book, a range of emotions are at work when the research refers to 'uncertainty', 'tensions', 'distress', 'safety', 'shame', 'engagement', 'resilience', and 'agility'.

Noting the under-communicated emotions means recognising states often hidden from the surface of the methodology, including those with either negative or positive connotations. Even if emotions can be self-regulated, first after a cognitive recognition of what they mean in relation to the social context, it might be difficult and even impossible to control every aspect of biological motion set off by emotions. Emotions will disturb and even alter conditions in the social context and, therefore, notably in the research methodology. Being a field of predominantly women, ignoring emotions can mean ignoring cultural taken-for-granted gender discourses and practices in society. Valuing emotions is, therefore, a key issue in early childhood educational research.

Being in power has historically been associated with men, while powerlessness has been associated with women. Research during the global pandemic revealed an increase in female vulnerability. Male violence towards women increased in this period, at the same time as the complexity of women's conditions increased (Pfitzner et al., 2020). Knowing that in the field of early childhood practitioners and researchers are predominantly female, valuing emotions is, therefore, a key determinant in understanding the field. Digitalisation in our context, in times of crisis, means that the emotional triggers of motives and demands are not neutral but must be considered both culturally and historically.

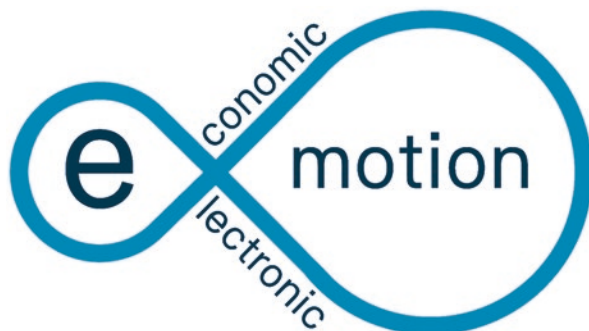


Fig. 1.2 E-motion – dialectical motion between economics, electronics, and emotions

Consequently, we bring forward how economics is also an e-motion. This can refer to economic motion, electronic digital economics, and emotions. The crisis creates new conditions of labour, and how this plays out is differently experienced. Figure 1.2 is illustrative of one way to conceptualise the relations between emotions and economics in the context of electronic digital research.

1.3 Research Practices in Times of Crisis

In this section of the chapter, we look at how research practices have shaped the development of the concepts previously discussed and how the new concepts have enabled different ways of practising research. Chaiklin (2011) famously said that ‘All sciences have an *object* toward which they are directed’ (p. 227; original emphasis), and in our case, it was *how to do research during times of crisis, and how to take into account new societal conditions*. In addition to the societal conditions, we realised that *nature, as biological and material conditions*, must be considered when researching children’s development and conditions for professionals, families, researchers and their collaborative partners. Nature is unpredictable and will suddenly alter the more stable conditions we are used to considering in research and practice. Chaiklin (2011) said, ‘*Human practices* are manifest in institutionally structured traditions of action, which are organised in relation to the production of collectively needed products’ (p. 227). However, as will be shown throughout the forthcoming chapters, the actions and products of the institutional academy of the university were no longer possible (Part IV) when PhD students and academics could not enter the country to gather data (Sect. 3.1, Chap. 3), participate in the living laboratory of a childcare centre or kindergarten (Sects. 1.2 and 1.5), or introduce interventions in family homes (Sec. 1.3). The problem was that researchers could not enter into the institutional practices that were foundational for their research, and the study designs and associated methods were no longer relevant for answering the research questions posed by the researchers. When a pandemic, earthquake,

flood, tsunami, slide, fire or volcano hits, human practices previously manifested in institutional traditions might not be given sufficient analytic power to understand human practices.

Chaiklin (2011) shows how, in the dialectical tradition, scientific work includes ‘analytical perspectives about the goals and purposes for research, conceptions about the object of analytical focus (i.e. ontological dimensions), and conceptions about the kinds of scientific analyses that one seeks to make (i.e. epistemological dimensions)’. Whilst the goals and purpose of the research would appear to have remained during the period of the pandemic, the challenges associated with the analytical focus had to bring in the scientific concept of crisis but in relation to the everyday lived realities that the new demands of a pandemic made on the researchers (the role of the researcher) and the participants. Similarly, the epistemological dimensions of the research were also in flux because researchers could not use existing and well understood methods, such as an educational experiment, to generate data to answer the original research question (Sect. 1.1) or employ historically developed cultural-historical concepts for scientific analyses to realise the goals of the research (Sect. 1.2).

New methods to meet the object of the research were developed through the process of the new practices. A reliance on the available digital tools was needed to enable access, data collection, new forms of digital analysis, and pedagogical innovations. The digital conditions that emerged, such as a ‘research fairy’ Zooming from Australia into a childcare centre in China (Chap. 3) or posting a diorama to a kindergarten with a digital device that could Zoom in the researcher to interview children (Chap. 5), had not previously been imagined or crystallised (Vygotsky, 2004) into the institutional research practices of the academy. The new digital conditions allowed more explorative and cross-country collaboration (see also as this book documents). Two key digitally enabled research practices are shown throughout the chapters of this book, namely:

1. *The digital educational experiment*
2. *The role of the researcher in digitally enabled research*

Digital Educational Experiment

Vygotsky (1997) argued that ‘Usually the decisive moment of the experiment—the instruction—is left outside of the field of vision of the researcher. It is not subjected to analysis and is reduced to a secondary auxiliary process’ (p. 36). In line with this principle, we determined that it was through the everyday crisis of the global pandemic that researchers and research participants began to digitally document their shared theoretical problem (Hedegaard, 2008) by recording their sessions on Zoom. That is, they included in the research the ‘instruction’ associated with the research need. Different to the *in-person practices* of an educational experiment, where cameras, notes, or audio recorders are used and highly visible (and sometimes intrusive), the researchers and research participants simply pressed the record button on the Zoom app to document interactions.

The digitally enabled educational experiment is shown in Sects. 1.1, 1.3, 1.4, and 1.5 in a range of centre and family contexts. What is common to the research practices is how the Zoom facility and digital recordings acted as an auxiliary device in the educational experiment to enable efficient connectivity between researchers and research participants. Vygotsky (1997) says that both tools and signs are mediated, and in the context of a digital educational experiment, the mediated activity takes place virtually between researchers and research participants in their quest to achieve a common goal associated with the theoretical problem that is the core dimension of their collaboration. No travelling to sites or to the university by participants is needed. A convenient short meeting can take place in the car, lunchroom, or family home. It is not the device but how the device acts as the tool for mediated activity. As Vygotsky (1997) suggests, ‘we usually speak of tools when we have in mind the mediating function of some object or means of some activity’ (p. 60).

Mediation in a digital environment brings with it a particular genre but also new possibilities not yet imagined, such as being inside a diorama or Zooming in as a research fairy to interview children. In a digital educational experiment, the digital tool acting as an auxiliary device (an enabler of the research fairy or being projected from inside a diorama on a device) enables the intervention under study to be implemented through virtual means whilst at the same time capturing the collaborations as they are being constructed and transformed over time. The duality is made visible as both a tool and as the sign, but the core is always the mediating activity:

The use of auxiliary devices, the transition to mediated activity radically reconstructs the whole mental operations just as the use of a tool modifies the natural activity of the organs, and it broadens immeasurably the site of activity of mental functions (Vygotsky, 1997, p. 63).

Using a digital platform (Zoom), as a supplementary device not only enabled us to continue to research in new ways, but the mediated activity, as the quote from Vygotsky suggests, also radically reconstructed ‘the mental operations’ of the research participants.

What is also different in the context of a digital educational experiment is that the researcher can be both physically located in their home, university, or other worksite but also be internationally connected. The geography of the researcher is no longer crucially relevant.

In summary, the device and the apps are the vehicle, but how they are presented to children or used by researchers and teachers in their collaboration for introducing an intervention are shown across the chapters to be under construction, to transform practices, and in need of being theorised. The researchers did not know if the auxiliary device would support the mediating activity they had imagined as core for their digital educational experiments. The new concepts that arise from the new practices of a digital educational experiment add to the available research methods for studying children’s development and teacher practices within the institutional settings of early childhood.

The Role of the Researcher in Digitally Enabled Research

The role that a researcher takes in cultural-historical research has already been theorised by Hedegaard (2008). She identifies the duality of the position held by the

researcher—as both a partner in the activity setting that is under investigation but also as someone who is trying to understand what is going on in everyday practice. But what does this mean when the activity setting is virtually located and the researcher is not physically in the everyday practice?

In a digital context, the researcher still focuses on the motives and intentions of the research participants. However, new concepts are needed in the practices of following and interpreting motives and demands in a virtual activity setting. In the section above, the concepts of *digital agency*, *boundaries of digital spaces (hologram)*, *distal contexts*, *collective digital relationality*, *transient demands*, and *potentiality as transitory* were introduced to theorise the new methods of digital time and digital space. How these relate to the practices of the researcher for a digital context is now elaborated in relation to Hedegaard's (2008) original theorisation of researching child development.

First, Hedegaard argues that the researcher needs to orally or in written form give an introduction when first making contact with children and educators in the particular educational setting. This orientation is important for establishing a relationship. However, in digitally enabled research, particularly during a global pandemic when these settings were closed to visitors, this created new demands on researchers based on how to orient the participants to the research and to build a relationship between the researcher and the research participants. The crisis called for digital agility (Part V).

Hedegaard also warns about the risk of the researcher taking over the activities when in the context of the research site, such as the family home or kindergarten. The researcher is not expected to step in as the teacher. However, at the same time, the researcher does not simply remain aloof and not respond to the situation if a child hurts themselves or is in danger. There is a fine balance between the researcher's position and the position of a human being in the context of the research site. However, as noted in Part III, the researchers take a much more active role by being both the researcher and the person implementing the pedagogical intervention when Zooming directly into family homes and creating new developmental conditions for children and families. The digital context demands that the researchers be more active than suggested by Hedegaard (2008). However, at the same time, the new conditions are co-experienced by the children and their parents with the researcher—sometimes synchronously and other times asynchronously. The following chapters show how this binary did not capture the new practices, however, and how new concepts were needed to name the new research conditions, notably, *distal contexts*, *collective digital relationality*, *transient demands*, and *potentiality as transitory*.

The digital environments that are showcased across the chapter are not naturalistic research sites, such as the family home, university, school, or kindergarten, as is characteristic of traditional research practice. The digital environments are difficult to research because they are emerging and transitory new kinds of settings, and therefore have to be conceptualised in practice differently. In particular, the concepts of *boundaries of digital spaces and practices* (Part III), *the university as a hologram* and *dis-situation of development* (Part IV), and *resilient digital agility* (Part V) are introduced to capture and theorise the new dimensions of the practices.

Boundaries are also brought forward into digitally enabled research because researchers can work internationally with ease.

1.4 Methodological Dimensions of Digital Research Methods

In order to capture and theorise the new digital research practices, we introduce our model. Inspired by Hedegaard’s model of development, our model brings forward a dialectical relation between the everyday and scientific readings of the crisis that generated digital research solutions.

The global pandemic created new societal and international rules that placed new demands on researchers as they digitally traversed the multiple institutions of the university and the research sites specific to early childhood. The new demands oriented and motivated the researchers to develop new research methods that were realised as recurrent digital practices within the digital activity settings.

The model shown in Fig. 1.3; Cultural-historical Loop Model, enables thinking and analysis of human action and development conditions. The model responds to the situation of the crisis and the conditions created in the historical times we live through. Within the model, concepts, settings, and practices dialectically come together to capture and unpack the complexity of the child’s development in the framework of the crisis. Dynamic and porous borders are symbolised in the model by the mobius image. The metaphor of the Möbius strip is named for the German pioneer in topology, the mathematician and theoretical astronomer August Ferdinand Möbius. A Möbius strip is a property of a flipped one-sided surface: after two loops, you can come back to the beginning in one movement. It constitutes a shape that can be defined as ‘a continuous choice of local orientation’ or a space that is orientable

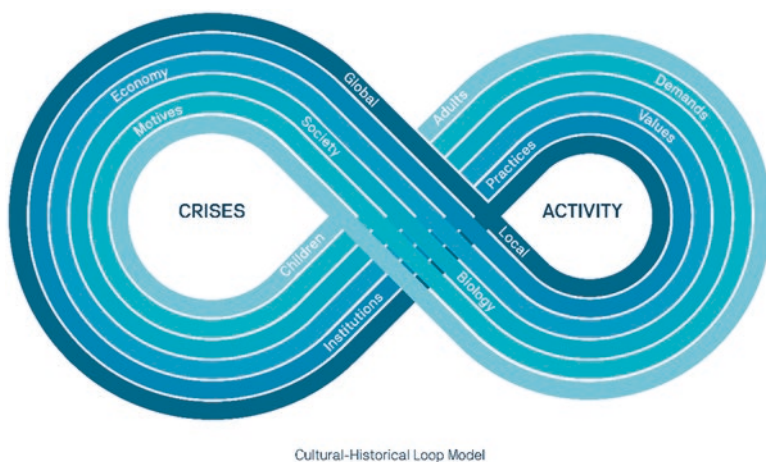


Fig. 1.3 Cultural-historical Loop Model

with multiple start and stop points. You can choose ‘inward’ and ‘outward’ or ‘up’ and ‘down’ directions (Alagappan, 2021). This visual metaphor is used to image ecological circulation that reminds us to reduce, reuse, and recycle. Figure 1.3 is not just a visual metaphor for circular action; it also visualises the dynamic nature of cultural-historical processes—how conditions for human action are interdependent with material, economic, and social conditions. Figure 1.3 visualises interdependent aspects of a sustainable loop. This choice allows us to illustrate in a symbolic way fluidity and mutuality to showcase the changing nature and dialectic interrelations between the dimensions illustrated in the model.

For example, during the pandemic, institutional settings and home settings were merged (e.g. home schooling, home office) or institutions appeared to be in transition (e.g. delivering university courses online). The disturbed and in many cases ambiguous boundaries allowed for quick and/or partial shifts (e.g. being in your room but at the same time being in the classroom). Representing these hybrid settings with the infinity image rather than the bubble image, we wish to represent the connections and contradictions between these settings, the motion between the transitions from one setting to another, and the dialect character of being part of diverse settings.

Following the same rationale, the child is not seen isolated in an autonomous context but dialectically connected to adults, peers, and artefacts. In the same way, global and local perspectives are unpacked to capture the societal aspect at the micro and macro levels and in context. In line with Hedegaard’s model, the activity setting is central in the above model. The activity setting here corresponds to the digital system activity setting. Demands, motives, and cultural values are also represented in the model in the same way as they are represented in Hedegaard’s model, but this triptych is extended by economic and biological conditions to acknowledge the critical role of economy as a value and biology as a reality in times of crisis. Crisis, as a concept and as an everyday phenomenon, is also placed at the top and at the bottom of the model to showcase that the child’s development is not just related or influenced by the crisis but rather is generated amidst the crisis and formed by it.

1.5 Conclusion

Although Vygotsky (1997) was interested in studying the cultural development of children, we find his general genetic principle of *all functions appearing on the stage twice* compelling for understanding the new digital research methods presented in the case studies of this book. Our model (Fig. 1.3) seeks to bring what is common across the chapters into a dynamic system of societal/global, institutional and personal within multiple imaginings of the digital activity setting. The duality of the person and the digital in practice becomes a synthesis (see above) paving the way for new ways of practice. This means that ‘genetically, social relations, real relations of people, stand behind all the higher functions and their relations’ (Vygotsky, 1997, p. 106) and we add to this the digital enabling methods that rapidly emerged through the crisis.

This book makes a scholarly contribution across the three broad principles of:

1. Dialectics
2. Historicity
3. Cultural-historical practice-centred science in times of crisis

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Part I
A Digital Educational Experiment

Chapter 2

Theoretical Framing of a Digital Education Experiment



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Abstract An educational experiment as a method was originally theorised as the study of a theoretical problem in practice in a context of a collaboration between researchers and teachers. But when teachers and researchers are not able to be physically together because of government guidelines restricting access, suspending research in schools and centres, or by reducing movement of a population through ‘lock down’, then how can an educational experiment be undertaken? The richness of the concrete research methods that follow are theorised through bringing together a system of concepts that enable a digital educational experiment to proceed under conditions of crisis, contradiction, and drama. Named as a digital educational experiment, the theorised model draws on Vygotsky’s original core conception of development, Hedegaard’s writings on an educational experiment, and the new methods presented in Sect. 2.1. It builds on the concepts of motives and demands in relation to digital environments and interactions, where time, space, and physicality are virtually defined and enabled.

Keywords Digital · Educational experiment · Cultural-historical

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2.1 Introduction

...it should be taken into account that even the most brilliant scientist or thinker cannot be fully aware of his [or her] own consciousness and development of his (or her) own thinking. It requires special research of the dynamic logic of development of the investigation of a scientist or a thinker that reveals its contradictions and dramatic tensions as well as the transitions, shifts, and transformations that are provoked in different stages of his (or her) life course (Dafermos, 2018, p. 7).

The focus of Section One is on the digitally enabled collaboration between teachers and researchers under conditions of crisis, contradiction, and drama, where new levels of researcher consciousness emerge. This chapter gives a more nuanced account of the content introduced in Chap. 1 where a theorisation of a cultural-historical digital methodology in times of change, innovation, and resilience in the early years was presented.

The problem that this chapter addresses is how to theorise the new research methods that emerged in response to crisis, contradiction, and drama, as was experienced by researchers who sought to maintain their research collaboration in a time when research was being suspended due to the Global Pandemic. In line with Dafermos (2018), a major disruption to undertaking research changed the research conditions of the educational experiments, and as will be shown in this first section of the book, new demands were made on researchers which positively supported the development of innovation through digital means.

An educational experiment was never developed with a digital collaboration in mind. Consequently, the researchers who present their methods in the chapters that follow, show new ways of digitally collaborating in an educational experiment.

This chapter begins by discussing what is an educational experiment and what were the new demands placed on researchers and teachers during a Global Pandemic. This is followed by introducing the *motivating characteristics* and the *system of concepts* that enable a digital educational experiment to proceed. Finally, a *model of a digital educational experiment* is presented that draws on Vygotsky's original core conceptions of crisis and development, and Hedegaard's concept of an educational experiment.

In line with the orientation of this book, the Vygotskian concept of crisis is used to theorise the system of concepts that make up the new methods shown in Sect. 2.1, giving methodological coherence and authenticity to what resulted in research practice, and what can be taken forward into future research.

2.2 What Is an Educational Experiment?

The chapters in Sections 2.1, 2.2 and 2.3 draw on the method of an educational experiment. An educational experiment is a planned intervention. It was originally developed by Mariane Hedegaard (2008) as a *dialectical–interactive method* where an intervention into practice is made. The dialectical–interactive method has its

roots in cultural-historical theory. “Dialectics offers an advanced theoretical framework for the conceptualization not only of the movement, change, and development of the social world but also the logic of thinking that reflects it” (Dafermos, 2018, p. 7). Therefore, an educational experiment cannot be a simple pre and post implementation of an intervention.

Hedegaard (2008) describes two phases that are foundational for setting up an educational experiment. In the first phase she says the researcher is close to the social practices that she wishes to study. But the researcher only has a general idea of how to plan the intervention into practice. In this first phase the researcher observes, records, and interprets the social practices and brings forward some preliminary theoretical conceptions. Hedegaard (2008) has said, “Through interpretation of these protocol records some conceptions about the object of research can be formed and the researcher can systematise the knowledge and formulate models of relations” (p. 182).

In the second phase the researcher uses the results of the first phase to design the educational experiment. During the first phase the researcher formulated the conceptual relations within the problem area, and these are drawn upon to design the intervention into everyday practice. Hedegaard (2008) explains the methodological aspects of the second phase as being “characterised by the researcher’s intentional transformation of practices in the problem area to bring out the central relations” (p. 182).

The concept of *central relations* is derived from the theorisation of Davydov (1972/1990) who showed how empirical knowledge was generated in research as building blocks of new understandings. He theorised that empirical knowledge in this form, did not bring forward the central relations between the blocks of knowledge—that is, it does not show their relations. Whilst interventions are common in the sciences, the focus is causal and not relational, and thereby the pre and post implementation of the intervention does not seek to determine what might be the central relations or core relational knowledge. Different questions are asked when a cultural-historical methodology is used to conceptualise the methods of the research. How are units of empirical knowledge connected? Are there relations between them? Could a model of relations be determined during the process of development? To answer these kinds of questions and to capture the core relations in social practice, Davydov (1972/1990) proposed that researchers build studies of social practices as *relational units*. He named this method as a *model of theoretical–dialectical knowledge formation*. Davydov (1972/1990) called this way of researching in schools as an *educational teaching experiment*. Hedegaard (2008) has been inspired by Davydov, but she brings into this theorisation an *interactive dimension between the collaborators*, which she names as a *dialectical-interactive method*. In so doing, Hedegaard (2008) reformulated the educational teaching experiment of Davydov (1972/1990) into an *educational experiment into social practices*.

Hedegaard (2008) argues that “The educational experiment is a multifaceted planned preparation of teaching which has, as its goal, the creation of optimal conditions for the learning and development of the participating children” (p. 185). She said, “In this type of research it is very important to have clear models of how

teaching content should contribute to children’s learning and motive development” (p. 185). Foundational to her research is the *double move* (Hedegaard & Chaiklin, 2005), with the problem of how to bring out the subject matter or discipline content to be learned, at the same time as ensuring that the content becomes personally meaningful to the children. This multifaceted planned preparation of teaching demands that researchers and teachers become collaborators in the *educational experiment*.

2.3 New Demands on Teachers and Researchers

In an educational experiment as formulated by Hedegaard (2008), great importance is placed on the collaboration between the researchers and teachers. Both researchers and teachers have as core the joint project with the goals for the intervention. Hedegaard (2008) has said, “What makes the educational experiment different from action research is, first, the cooperation that exists between two or more professionals ... and, second, the theoretical conceptions that frame the intervention” (p. 200).

In the educational experiments conducted by Mariane Hedegaard, the cooperation between the researchers and the teachers was undertaken in person in a range of practice settings such as classrooms (Hedegaard, 2002), an afterschool program (Hedegaard & Chaiklin, 2005), and in a context that regularly brought kindergarten teachers and primary school teachers together in one room with the researcher (Hedegaard, 2017). The former focused on how to create motivating conditions for learning school discipline concepts, whilst the latter was oriented to the theoretical problem of the transition from play to learning across the institutional settings of kindergarten and school.

But when it is no longer possible to physically bring researchers and teachers together for planning and implementing an educational experiment, new conditions for collaboration are needed. The Global Pandemic created in Australia a new kind of societal context, in which Departments of Education suspended all field research in public schools and early childhood settings and stopped flights in and out of Australia, which significantly disrupting national and international data collection processes. This new societal condition created new demands on the researchers that needed to be resolved. New forms of conducting an educational experiment were needed, and in this Sect. 4 concrete methods of how the drama, tension, and crises gave new possibilities are introduced, analysed and theorised. The new digital research methods that resulted from the changed societal conditions gave new ways for researchers and teachers to collaborate. For example in Chap. 3, new ways were found, where PhD researchers Yuejiu Wang and Yuwen Ma formed a research partnership so that they could undertake an educational experiment with their collaborating teachers in China. Border restrictions in Australia prevented Yuejiu from entering Australia and Yuwen from leaving Australia. All flights in and out of Australia were suspended. As is described in Chap. 3, Yuejiu and Yuwen begin communications with a kindergarten in China as Phase 1 of the educational experiment.

Yuejiu meets in person with the teachers. Yuwen zooms in to be with the teachers and Yuejiu, as they begin planning the implementation of an intervention. In line with Hedegaard (2008), Yuejiu and Yuwen spend time in the centre observing, recording and interpreting the practices of the teachers. The theoretical problem they are seeking to solve, is how to make their programs more playful so that children's learning of STEM can give more agency and degrees of freedom to the children.

To achieve active multi-modal collaboration Yuwen zooms into the classrooms as a research Fairy. She joins in the intervention into social practice in an active role of a researcher inquiring into the children and teachers' practices. To bring the children close to the digital device that is placed in the classroom, Yuejiu organises a magic carpet and a magic rope to create motivating conditions for the children to talk to the Research Fairy. The new interactions between the researchers across countries and through the digital means, make visible to the teachers the children's thinking in relation to the intervention into social practice. A new level of consciousness about the social intervention into practice as a new form of dialectical-interactive collaboration expands the original model of Hedegaard (2008) into the second phase of the educational experiment.

Dealing with the problem of not being able to enter the research site was also a new demand placed on PhD student researcher Monique Parkes. She describes in Chap. 4 how she created in miniature form a research diorama of the intervention that was taking place in the centre. Inside of the diorama was placed a digital device which Monique used to zoom into the diorama. She was dressed up as a character from the story book the children and teachers were focused on as part of the intervention. The miniature form of the intervention into social practice created a completely new method of dialectical-interaction not part of the original conception of Hedegaard (2008), but conceptually closer to that of Davydov (1972/1990) where a core model is theorised from the practices. In condensed form, the intervention inside of the diorama gave teachers and researchers a mirroring process, and also a core model of practices for dialogue and analysis.

Liang Li describes in Chap. 5 her collaborations with teachers using WeChat. Liang creates conditions for localised, individualised, and immediate dialogue of the planned intervention. The teachers send video clips of their practices, photographs of contexts, and text messages inviting dialogue with Liang on the planning associated with the intervention (Phase 1). Together they conceptualise the theoretical problem and the new practice, which are then made visible through WeChat as an intervention into social practice (Phase 2). A virtual dialectical-interactive method expands on the original work of Hedegaard (2008).

The final chapter in Sect. 2.1 examines how digital tools can capture practices of the intervention through a GoPro. Xianyu Meng as part of her PhD studies formed a digital collaboration between her intervention practices in China and her supervisors in Australia to work on a theoretical problem. Phase One of the Educational Experiment was not necessary because the researcher was also the teacher. But to achieve a level of consciousness (Vygotsky, 1997), Xianyu captured her practices of the intervention which she then used as a common source of inquiry between Xianyu

as a teacher-researcher and her supervisors. Different to action research, the collaboration focused on analysing the observation protocols which gave new insights of how to undertake a remote intervention in collaboration with her supervisors and herself as the teacher-researcher. A new method of collaboration was formulated which expanded the original dialectical-interactive method designed by Hedegaard (2008).

When the four types of problem-resolution processes of the dialectical-interactive method are brought together, they can be represented as shown in Fig. 2.1 as a problem-solution dynamic.

The methods in Fig. 2.1 are shown as problems and solutions which build on the concepts of motives and demands in relation to digital environments and interactions, where time, space, and physicality are virtually defined and enabled. Dafermos (2018) has suggested that in research where the goal is the production of knowledge, this process is not timeless and spaceless. It happens in a concrete setting, where there is “a complex intertwining of temporal and spatial relationships” (p 5). Yet the new dialectical-interactive methods discussed in this chapter suggest that a *virtual dimension* needed to be considered in this cultural-historical theorisation of an educational experiment.

The Global Pandemic meant that researchers had to imagine new ways of overcoming the problem of being unable to physically be with teachers, and this crisis created new ways of conceptualising interactions between teachers and researchers in an educational experiment as described by Hedegaard (2008). The intertwining of temporal and spatial relationships occurred across countries through zoom as a Research Fairy (Chap. 3), through the appearance of the researcher inside a diorama (Chap. 4), as a WeChat dialogue in words and images (Chap. 5), and as GoPro

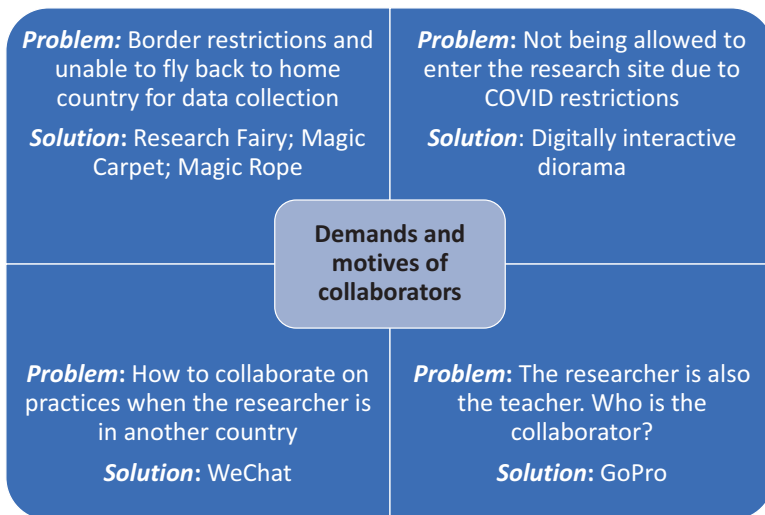


Fig. 2.1 Problem-solution dynamic

footage of practices of the researcher-educator in a dual role and remotely with her supervisors (Chap. 6).

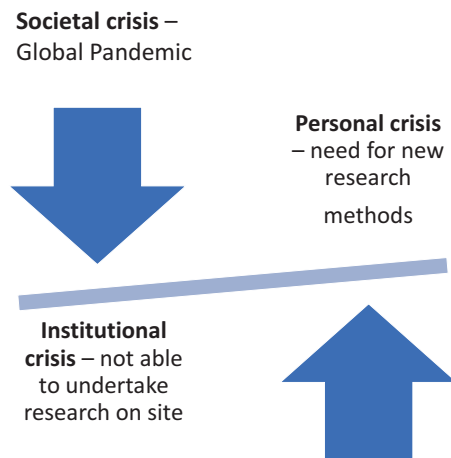
2.4 Methodological Characteristics of Digital Collaboration in an Educational Experiment

To understand how crisis is central to the development of a digital educational experiment, we must first consider the 3 ways in which the concept of crisis acts as a motivating force. Crisis as an everyday concept was explained by Dafermos (2022) as part of the tragedy that made up Vygotsky's life course and which deepened his attention on theorising a scientific concept of Crisis. This concept of crisis is personally felt, at the same time as being institutionally experienced, and socially determined. Figure 2.2 shows these relations.

In the context of the Global Pandemic, the restrictions and therefore the resultant dramas will be experienced differently by each researcher. For instance, Vygotsky (1994) wrote, "The crux of the matter is that whatever the situation, its influence depends not only on the nature of the situation itself, but also on the extent of the child's [researcher's] understanding and awareness of the situation" (p. 343). Researchers represented in Sect. 2.1 were all at different points of their research trajectory—some at the beginning of conceptualising an educational experiment (Chap. 4), during the process of setting up data collection (Chap. 3) or after data collection (Chap. 6). But it is important to also note that the PhD students (Chaps. 3, 4, and 6) and experienced researchers (Chap. 5) still experienced the crisis.

A level of personal consciousness as a researcher emerges because "*we are always dealing with an indivisible unity of personal and situational characteristics, and which are represented in the emotional experience*" (Vygotsky, 1994, p. 342; original emphasis). The emotionality of the experience has also been expressed in

Fig. 2.2 The relations between societal, institutional, and personal crises



how researchers of the chapters that follow dealt with the challenges and formed new levels of conceptual consciousness. For instance, in Chap. 4 Parkes talks about the need for continuing her research, and the new insights gained when she said, “Propelled by the conditions of a crisis, new methodologies were needed *to continue research...* [from] thinking about digital technologies and young children *beyond the divisive binary* of digital and non-digital” (our emphasis). Similarly, in Chap. 6 Xianyu shows through her dialogue with her supervisors that she comes to think differently about her results:

At the beginning, the Educator-researcher explained how the participating children were unable to get into their play roles like in the playworlds organized elsewhere, “Shanshan [pseudonym] was unaware of what’s going on, but ... My playworld is totally *chaotic*, it’s hopeless.

Marie: “*Chaos* doesn’t mean hopeless.” The theoretical understanding of “chaos” shared interpsychologically inspired the educator-researcher to look at the children’s life and their original institutional practice to understand children’s initial reactions to playworld”.

A new perspective on the same situation gives insights into the development of the researcher. The crisis that was experienced was productively resolved. In Chap. 3, Yuwen and Yuejiu show how the resolution of their crisis brought innovation through designing new methods

the challenges brought by the COVID-19 pandemic are regarded as crises which promote the research innovation process. ... As a research fairy, the researcher brought magic and new dramatised problems to the Conceptual PlayWorlds sessions.

What was common to all novice and mature researchers was the concepts from cultural-historical theory, alongside of a collective context of studying these concepts in relation to researching children and teachers’ development using an educational experiment (Hedegaard, 2008). Mature forms of concepts and the methodology of a dialectical-interactive method were always available to the research community, and in line with Vygotsky (1994), the developed form of an educational experiment “acts[ed] as a model for that which should be achieved at the end of the developmental period” (p. 348). Vygotsky (1994) argued that “*Something which is only supposed to take shape at the very end of development, somehow influences the very first steps in this development*” (p. 348). But when societal conditions change, and mature forms of a research practice cannot be undertaken, this disrupts the developmental trajectory of the researcher. Though this crisis of the Global Pandemic, both researchers and teachers became more conscious of the concepts they were working with, so that they could develop methods to support their planned intervention, so that it was in keeping with the theoretical integrity of an educational experiment.

We must also consider that the scientific concept of *Crisis* was used in association with the general cultural age periods, where *Crisis* explained how children moved from one motive orientation to another. We have deliberately capitalised the term to signal its theoretical status. There is also *crisis* which captures the dramatic day to day moments or tensions or contractions that orient children towards a new

motive. They represent small steps that collectively can lead to an overall change in a child’s motive orientation. We suggest that by writing the term without a capital, this marks a smaller zig zag and iterative or spiral progression in development. We argue that crisis and not Crisis was foundational to how the researchers experienced the new societal and institutional conditions (Fig. 2.3). In many respects, we can theorise that the Global Pandemic as a societal crisis was like the life course trajectory of Vygotsky, and this not only focused the researchers attentions on the problem of designing an educational experiment, but it also created the dynamic conditions in a condensed form of how to bring into the educational experiment digital tools for supporting the foundations of the dialectical-interactive method in which a collaboration around a theoretical problem and not just a problem of practice is core.

Researcher consciousness of what mattered in an educational experiment emerged and supported a new self-awareness of the professional and dynamic role of collaboration in a dialectical-interactive method by the researchers. It was through the resolution of the crisis points experienced, that innovative methods emerged as catharsis of positively being able to continue to undertake research during a Global Pandemic. Dafermos (2022) has said “The concept of ‘crisis’ is crucial for understanding not only psychological development but more broadly human development in the wider context of social, cultural history... It is difficult to understand personality development without a broader vision of society and its internal contractions” (p. 9). Adding to this, we have also noted how the dialectical relations between the ideal and real form of an educational experiment would under normal circumstances describe the process of development over time of researchers, because “mastering certain forms of activity and consciousness which have been perfected by humanity during the process of historical development, ... [and this] provides the foundation for this interaction between the ideal and rudimentary form” of development (Vygotsky, 1994, p 252). However, when the ideal form is disrupted by a Global



Fig. 2.3 Methodological characteristics deployed by collaborators in a digital educational experiment

Pandemic, it becomes an historical moment in the course of human development. It becomes possible to see how new ways of being and researching emerge in an accelerated and critical form at those points in history (Vygotsky, 1997).

2.5 Characteristics of the New Digital Methods Embodied in an Educational Experiment

When the new research methods shown in Chaps. 3, 4, 5 and 6 are considered, there appears to be a set of common characteristics of the new digital methods embodied in an educational experiment.

First, *crisis appeared to act as a positive developmental force in setting up and developing the educational experiment*. That is, the Global Pandemic created societal and institutional conditions that allowed for the invention of new research practices and different ways of developing a collaboration. Vygotsky (1998) in his writings on the concept of crisis in psychology during his time, brought out a whole new system of dialectical concepts for undertaking research into human development. As noted by Dafermos (2018):

The elaboration of the concept of crisis was one of the essential innovations of Vygotsky's theory of cultural development. It should be noted that Vygotsky focused not only on the profound negative aspects of the crises, but mainly on qualitatively new potentialities that are created for child development (p. 178).

In the digitally enabled educational experiment, development of new dialectical-interactive methods resulted giving qualitatively new ways that researchers and teachers could work on the problems of (1) social practice; (2) theoretical problem of the intervention; and (3) how to collaborate under the new research restrictions. Researchers and teachers co-existed remotely in continuous dramatic situations of how to plan and implement an educational experiment. This is consistent with how crisis is conceptualised by Dafermos (2018):

Crisis can be conceptualized as critical situation of the dramatic coexistence of conflicting possibilities of development. A crisis can be examined as a Pandora's box of risks and dangers (Dafermos (2018, p. 178).

The teachers and the educators seeking to work out how to collaborate in an educational experiment through digital means experienced a dramatic co-existence of problem situation with the added complexity of using digital tools to solve how to collaborate. This was also a Pandora's box because no way of working digitally in an educational experiment had been previously conceptualised. The authors of the chapters that follow give detail of their Pandora's box (Fig. 2.1). Like Dafermos (2018), Ilyenkov (2009:185) has discussed the drama of Pandora's box as a *resolution of a contraction*, and in so doing shows how something new can emerge:

Contradiction is the concrete unity of mutually exclusive opposites is the real nucleus of dialectics, its central category (Ilyenkov, 2009: 185).

But the resolutions of the contradictions (Fig. 2.1) and the drama of new ideas were for the researchers and teachers not straight forward. In keeping with how Dafermos (2018) has argued that the development of cultural-historical theory emerged, “A dialectical approach brings to light the logic of the development of Vygotsky’s theory in terms of a drama of ideas and discloses zigzags, returns and loops in the process of its building, rather than a linear accumulation of new knowledge” (p. 7). It can be argued that *crisis appeared to act as a positive developmental force for teachers and researchers in the chapters that follow, as researchers set up and developed their collaborations in the educational experiment through digital means.*

Second, the new digital methods for collaboration between researchers and teachers emerged through a *resolution of specific crises*. Dafermos (2022) has argued that it is not possible to understand the works of Vygotsky without the concept of crisis. He draws a parallel with the scientific concept of crisis and the differing historical moments of Vygotsky’s personal crises:

Vygotsky during his life course had experienced various crises: He experienced discrimination and pogrom against the Jewish population at an early age and the death of his family members. He suffered not only from progressive form of tuberculosis but also from unfair criticism of his theory and the split in his school. Growing through multiple crises, Vygotsky’s sense of the complexity and contradictory nature of social and personal life was deepened (Dafermos, 2022, p. 5).

What Dafermos (2022) draws attention to is the significance of the relation between the personal crises and the development of the scientific concept of crisis that emerged in Vygotsky’s theory of human development. In line with this logic, the societal crisis of the Global Pandemic created personal crises for the researchers, and because they each could not physically be in a research site in collaboration with participants, this also deepened their understandings of cultural-historical theory and developed a personal motive to undertake research in new ways. Moreover, the crisis created dynamic and dramatic conditions for productive research. As Dafermos (2022) has suggested, “Vygotsky’s life and development of his theory can be understood as an optimistic tragedy” (p. 5). The digital means of collaboration also became an optimistic tragedy as researchers investigated what digital tools could be harnessed to support collaboration, such as using a zoom app on a digital device (Chaps. 3 and 4). In my respects, the *researchers experienced self-development through resolution of their own person crisis.*

Third, we need to draw on other concepts from cultural-historical theory, such as, *the dialectical relations between idea and real form*, to support a better understanding of the nature of the emerging remote educational experiment, and the new ways of conceptualising what collaboration meant in this form of an educational experiment. Researchers used the digital technology for remotely bringing into the research site the researcher. As is shown in Chap. 4 by Monique Parkes, a diorama acted as the ideal form of the planned intervention. The researcher was able to enact Phase 1 of the educational experiment by zooming into the diorama on the device and to interact with the teachers and the children, followed by Phase 2 where the researcher became a character from the stage set of the diorama, thereby bringing into relations the real form of development of the children and the teachers

associated with the intervention. *The relations between the ideal and real form of an educational experiment was enacted remotely through the cultural device of a diorama.*

Fourth, the collaborations between teachers and researchers were *amplified through the digital educational experiment*. In Chap. 5 Liang Li used WeChat as a tool for collaboration, but also WeChat to digitally capture the observation protocols of practices for discussion between researchers and teachers. The synchronous nature of capturing and immediately discussing the new social practices, gave real time developmental opportunities for continuing the intervention. The digital capture could be jointly worked on by the teachers and researchers, and this appeared to amplify the developmental production (rather than replication) of the new social practices that were part of the intervention. The GoPro camera that captured all of the practices of the teacher-researcher, as is shown in Chap. 6 by Xianyu Ma, gave a moment-to-moment capturing of the educational experiment in action. The digital material as a visible treasure trove of social practices, became the joint project of the teacher-researcher and her supervisors as they brought concepts to their analysis of the observational protocols. The collaborations between teacher-researcher and supervisors were amplified because the digital observational protocols could be shared using VPN platform and collectively discussed in relation to the theoretical problem and the planned intervention.

Fifth, the new digital methods that were developed by the researchers were able to *generate theoretical knowledge of the virtual spaces and collaborations*. That is, the dynamic conditions of what it meant to undertake cultural-historical research had to be captured in a condensed form by the researchers if they wanted to bring into the educational experiment digital tools for supporting the foundations of the dialectical-interactive method. The digitally enabled diorama (Chap. 4) is an excellent example of this because the miniature form of the planned intervention located within the centre mirrored the processes and new practices for *generating theoretical knowledge*. The GoPro and VPN platform (Chap. 6) and WeChat (Chap. 5) gave a virtual space for the joint analysis of digital observational protocols where theoretical knowledge of the new practices through the planned intervention were made possible. Additionally, the multimodal context of a remote Research Fairy and local Magic Carpet and Rope (Chap. 3) *generated theoretical knowledge of the virtual spaces and new forms of collaborations made possible through multimodal contexts*.

Taken together, the chapters that follow show how each of the characteristics of a digital dialectical-interactive collaboration generated *a new consciousness of the researchers*. Vygotsky (1994) wrote that emotional experience of the person is “a unity of environmental and personal features” (p. 343) and that humans will experience the same environment differently based on their own social situation of development. Whilst Vygotsky wrote in relation to children, we can also take this theoretical premise in relation to the development of the researchers who were also in different periods of their own development as researchers.

A set of methodological characteristics that emerged can be summarised dialectically as:

Researcher development and Digital Educational Experiment.

Researcher development:

- *Crisis as a positive developmental force in research*
- *Researcher self-development through resolution of crises*
- *New consciousness of the researcher*

Digital Educational Experiment:

- *The dialectical relations between ideal and real form of an educational experiment was enacted remotely through a cultural device*
- *Digital amplification of an educational experiment*
- *Theoretical knowledge development in virtual spaces*

In line with Vygotsky (1998) who spoke about *development* as not a product, but rather as a process, we can conceptualise how the crisis of the Global Pandemic enacted a research context that supported researcher development, as well as the development of new cultural tools in support of an educational experiment. Therefore, when these methodological characteristics are brought together as shown in Fig. 2.3, they help explain both researcher development and the development of the new methods and their associated practices for remotely supporting a planned intervention into social practice as a digital educational experiment.

Our *model*, named as a *digital educational experiment*, draws on Vygotsky's original core concept of development and his concept of crisis, Hedegaard's conception of an educational experiment, and the methodological characteristics that emerged through becoming and being researchers during a Global Pandemic. Whilst the historical moments that have generated the new demands and crisis conditions were unique, they too are symbolic of broader historical crisis periods which were in the past the crisis in psychology (Vygotsky, 1997), and in the future as new crises emerge. It is not the specific crisis, but rather it is the historical and symbolic crisis that is the productive force for the development of new methods and their theorisation as methodologies that has been the focus of this chapter.

2.6 Conclusion

One of the defining features of an educational experiment with its planned intervention and collaboration between teachers and researchers is the creation of developmental conditions for children in a condensed form. Rather than to wait for everyday life to bring forward dramatic moments that create developmental conditions, the planned intervention amplifies the developmental possibilities to bring into a condensed form those characteristics that can be studied. As Vygotsky and Luria (1994) have noted in their experimental-genetic method, "we are able to offer the subject tasks geared to different phases of development and to provoke in reduced form these processes of mastering tasks which allow us to trace, in the experiment, consecutive stages of psychological development" (p. 160). An experimental-genetic

method was realised through the digital educational experiment theorised in this chapter.

Hedegaard's (2008) characteristics of a dialectical-interactive method is elaborated in light of the new societal context of the Global Pandemic, and the resultant new research practices associated with the emergence of our digital educational experiment. This chapter explained how the digital tools and associated new research practices (Chaps. 3, 4, 5 and 6) acted as auxiliary devices for supporting new ways of collaborating between researchers and teachers in an educational experiment. Six characteristics of the educational experiment emerged under the conditions of a crisis, and when in relations with each other, new methods emerged that were theorised in unity as a digital educational experiment.

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Chapter 3

Beyond Physical Space: Using Digital Technology to Support a Collaborative Cultural-Historical Educational Experiment



Yuejiu Wang and Yuwen Ma

Abstract Through cooperation between researchers and teachers, the educational experiment creates optimal conditions for the development of the participating children, as well as the professional development of teachers. However, how researchers can virtually collaborate in conducting an educational experiment while maintaining their dual roles as participants and researchers is less understood. In order to address this problem, this chapter provides an effective methodological approach by showcasing how two researchers in two countries used digital technology as a relational tool to conduct educational experiments. A dialectical relationship between the research fairy who joined via Zoom and the imaginary situation is established, helping maintain the researcher's participating role. Additionally, digital technology helped two researchers develop dialectical relationships through mutual conversation, which enhanced theoretical problem-solving through the knowing and re-knowing process in the educational experiment. This multi-layered dialectical relationship was synthesised as a unity and created a new way of collaboration between researchers and participants in the cultural-historical educational experiment.

Key content: The research fairy and the researcher together with teachers enable a new way of working and researching through digital technology, addressing the challenges brought out by the COVID-19 pandemic.

Yuejiu Wang and Yuwen Ma are equal contributors to this work and designated as co-first authors.

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3.1 Introduction

The COVID-19 pandemic adversely affected educational research, which brought crises for cultural-historical researchers who needed to maintain active participation in the research activities (Hedegaard, 2008c). As argued by Hedegaard (2008b), participating in research activities requires the researcher to have a doubleness role—a researcher and a participant. Based on this crisis of active participation, this study illustrated how two researchers collaborate across geographical limitations to conduct a cultural-historical study through Zoom. To be specific, a cultural-historical educational experiment was collaboratively conducted by two researchers, emphasising the collaboration between researchers and teachers and aiming to promote children's learning and development in a theoretical way within naturalistic settings (Hedegaard, 2008a). Within the educational experiment, a play pedagogy named *Conceptual PlayWorld* (Fleer, 2018) was introduced to teachers to promote children's conceptual learning through play. This approach provides a new way for children to learn concepts in play by encouraging young children to go on imaginary journeys, meet and solve challenges, and learn STEM concepts (Fleer, 2018). Considering children's interests, two story books named *Breg's Tornado* (Boy, 2006) and *The Snail and the Whale* (Donaldson, 2003) were selected to conduct Conceptual PlayWorlds in two Chinese kindergarten classrooms respectively. According to the stories, children and teachers set up imaginary situations within a farm and the ocean and entered into imaginary situations as story characters to solve conceptual problems. This chapter begins with the background of this study, followed by the advantages of digital technology and cultural-historical studies using the digital visual methodology. Finally, drawing upon the theoretical concepts of crises, this chapter discusses how digital tools were used for researchers collaborating across geographical limitations to conduct a collaborative educational experiment from a methodological point of view.

3.2 Advantages of Digital Technologies and Early Childhood Education Studies Using Digital Visual Methodology

Digital technology is used widely in research, and it is approved to be a useful tool to promote teaching, learning as well as research processes (van der Linden et al., 2022). Firstly, digital technology played an important role in supporting children's remote learning during the COVID-19 pandemic (Timmons et al., 2021). Additionally, digital technology, such as video coaching, has been shown as an effective way to support teachers' positive pedagogical behaviour changes and pedagogical reflection (Körkkö et al., 2019; Şahin et al., 2022; van der Linden et al., 2022). Finally, digital technology was also found to be a useful tool to support the research process, which includes analysing data from a non-vocal process (Shrum

et al., 2005), conducting big data analysis (Körkkö et al., 2019), and enhancing research findings and the dissemination process (Walker & Boyer, 2018).

Taking the advantages of digital tools into account, researchers have begun to theorise *digital visual technology* as a research tool from a cultural-historical perspective. A cultural-historical methodology aims to expose the dynamic processes of development and reflect the conceptions of dialectical thinking and knowledge by exploring various types of social conditions (Hedegaard, 2012; Fler et al., 2020). By capturing the complexity of dynamics in children's social situations, digital visual technology provides a holistic and connected way of researching young children's learning and development (Fler, 2014a). For example, Fler (2014b) showed how digital video observations can be examined iteratively through the example of a toddler learning to walk. In this example, walking was not only viewed as physical action, but also as an emotional and cognitive activity from the holistic development view. Consequently, when digital technology is conceptualised through cultural-historical theory, how activity settings shape individuals and how individuals contribute to demands and conflicts in the activity settings can be examined differently (Fler, 2014b). This allows children's development to be captured holistically, commonly termed the wholeness approach.

A digital visual methodology was identified as a useful tool to study children's learning (Li, 2014; Ma et al., 2022), teacher pedagogy (Disney & Li, 2022), family dialogue (Monk, 2014) and researcher's positioning (Quiñones, 2014). However, it is unclear how digital technology could be used as a "relational" tool to promote and maintain the relationships between researchers, as well as between researchers and research participants. Hedegaard (2008b) argues that the researcher "enters into a social situation with other persons where she (sic) has to understand what is going on as a participant in everyday practice (p. 202)". While the COVID-19 pandemic brings crises in participation for the researchers who are off-site, the digital visual methodology has demonstrated its advantages in promoting communications. Through showcasing two researchers' collaboration in conducting an educational experiment, this chapter explores how the digital visual methodology is used for communications and interactions with participants.

3.3 Theoretical Discussion

The cultural-historical concept of crises was used to analyse the dialectical relationships within the educational experiment. In a cultural-historical educational experiment, researchers must conceptualise their own participation as part of the researcher's activities and actively explore the research question (Hedegaard, 2008a). Within this collaborative educational experiment, a multi-layered dialectical relationship is generated, which is the dialectical relationship between the research fairy and the imaginary situation, and the dialectical relationship between the two researchers.

3.3.1 *Relationship Between the Research Fairy and the Imaginary Situation: Researcher's Active Participation through Digital Technology*

The COVID-19 pandemic brings crises for the researchers to maintain a doubleness role in cultural-historical research, especially the participating role in the educational experiment. According to Vygotsky (1998), a new developmental period occurs when an individual experiences conflicting intentions, which leads to crises. However, there is an increased awareness in contemporary cultural-historical activity studies that the concept of crises should be expanded outside the bounds of psychology as a discipline (Dafermos, 2022). The definition of crises has been extended to an aspect of the lives of individuals and social groupings, as well as their existential conflicts, cultural differences, subjective resources, and vulnerabilities (Goulart, 2022). From this perspective, a crisis can be viewed as either a trigger for change or a component of changing reality. In this study, the challenges brought by the COVID-19 pandemic are regarded as crises that promote the research innovation process. With the support of digital technology, two researchers collaborated with teachers to implement the Conceptual PlayWorld in an educational experiment. After the collective discussion and planning, one researcher collected digital data on-site, while the other researcher joined the Conceptual PlayWorld as a fairy through Zoom, building relationships with children and teachers off-site.

As shown in Fig. 3.1, the role of the research fairy was generated from imagination in the Conceptual PlayWorld, where the researcher played the role of a fairy and interacted with children. Vygotsky (2004) argued that “imagination is not just an idle mental amusement, not merely an activity without consequences in reality, but rather a function essential to life” (p. 13). The collective imaginary space maintains children’s involvement and engagement in play (Fleer & Peers, 2012). In addition, it creates an effective way for researchers to communicate with children. As a research fairy, the researcher brought magic and new dramatised problems to the Conceptual PlayWorld sessions. For example, the researcher understood that children (sea snails) want to have a submarine to help the land snail go on an adventure with them. Therefore, she entered one of the Conceptual PlayWorld sessions as a research fairy and invited children to find the submarine which was parked on the

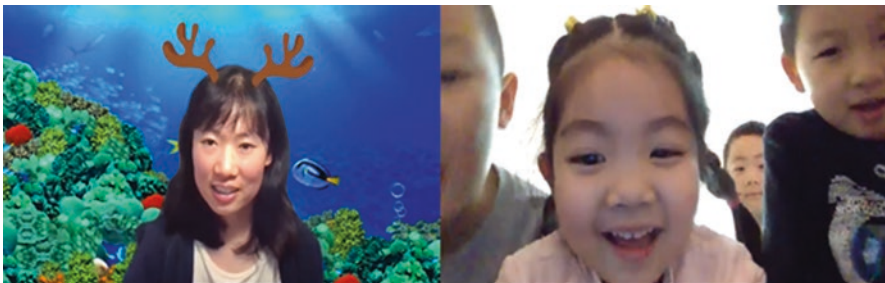


Fig. 3.1 The research fairy interacted with children

beach. This further made the Conceptual PlayWorld more dramatic and brought the researcher closer to the children. Later in the stimulated recall interview after this Conceptual PlayWorld session, the research fairy communicated with children based on the imaginary adventure in the submarine. Imagination is a collective historical experience that children can be lifted into with more experienced play partners or through the social actions of adults (Fleer, 2011). Therefore, children were eager to share with the research fairy about their experiences in the submarine. For instance, children shared with the fairy that they loved to be the snails because it was playing. While the children shared their experiences, they also asked the research fairy a series of questions, such as where did the research fairy live? Did the fairy have magic? Why is there a horn in the fairy's head? Since the researcher could maintain an equal position with children in the imaginary situation, the role of a fairy promoted the researcher's participation in the cultural-historical study.

In summary, there is a dialectical relationship between the research fairy and the imaginary situation. Dialectics is a way of thinking that focuses on examining each concrete object or individual in relation to other objects and individuals, as well as its internal contradictions and changing nature (Dafermos, 2015). As shown in fig. 3.2, the research fairy's role came from the imaginary situation and created a collective imaginary situation in which children could take part. Meanwhile, the research fairy brought dramatic information and created more communication opportunities which further enriched the imaginary situation. The relationship between the research fairy role and the imaginary situation shows the internal interdependency in addressing the participating role in the COVID-19 background. This dialectical

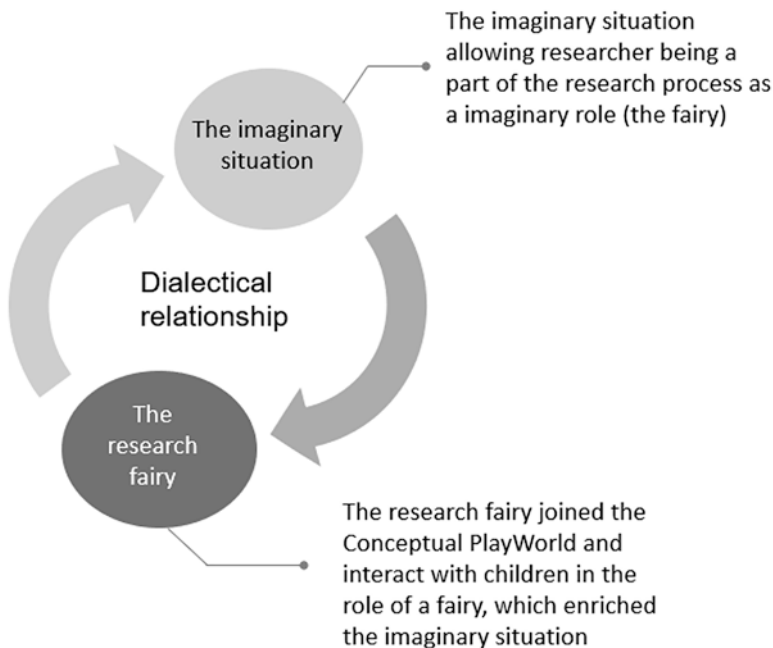


Fig. 3.2 The dialectical relationship between the research fairy and the imaginary situation

relationship makes full use of the role of imagination in children's leading activity of play and creates opportunities for researchers to interact with children through digital tools when researchers experienced crises in pushing forward the research process in the COVID-19 background.

3.3.2 Dialectical Relationships Between Researchers Within a Real Situation

Dialectical logic would seek to conceptualise the contradiction of the general and the particular together as a synthesis (Fleer, 2014a). For example, it is not possible to think about methodology development unless put in relation to general research background. The multiple crises as a result of the increasing social contradictions and asymmetries in a rapidly changing world may provoke interest in dialectics as a way of conceptualization of contradictions (Dafermos, 2018). COVID-19 brings a crisis to the research process, while digital technology creates conditions for researchers to enrich the cultural-historical methodology, which promotes remote data collection and analysis during the pandemic period.

3.3.2.1 Collaboratively Bringing Forward the Conceptual PlayWorld Implementation

Digital technology allows both researchers to maintain their role as researchers in the educational experiment (Hedegaard, 2008a), where a dialectical relationship between the two researchers was built and supported data collection beyond physical distance. Dialectics as a way of thinking emphasises internal, essential connections between people rather than a separated individual and an abstract consciousness (Dafermos, 2018, p.7). In this study, the concept of dialectics was used to understand the interrelation between the two researchers and how the relationship between the researchers influences the research process. In this research, researcher A physically entered the research setting to observe, and interact with participants, which allowed her to take an on-site perspective in the data collection process. In contrast, researcher B (the research fairy) was taking an off-site perspective in the data collection process. The digital technology allows two researchers to collect data from on-site and off-site perspectives in a dialectical way. For example, after the data was collected, researcher B watched the data from an outsider perspective and proposed the idea of changing the classroom environment (building a hot air balloon) to create a more imaginative environment. This motivated the two researchers to think about how they could create an imaginary situation based on the physical space in the classroom. As an insider in the data collection, researcher A knew that, given the physical environment of the research site, a hot air balloon would be too big for the classroom. Based on this, researcher A proposed that a magic blanket might work to support children and teachers to enter and exit the Conceptual PlayWorld. The idea

kept developing while researchers and teachers collaboratively designed the Conceptual PlayWorld. Considering the class scale, it was hard to find a blanket that could contain 30 children. Therefore, we decided that a magic rope could be used as a sign for children and teachers to enter into the imaginary situation.

3.3.2.2 Inspiring the Data Analysing Process

Following dialectical thinking, the current study focuses on the examination of researchers in their mutual connections, movement and development (Dafermos, 2015) and explains how the mutual connections between researchers support data analysis. In the educational experiment, all the activities were video recorded to help researcher B, who was physically outside the research site, get a holistic view of the research context. Digital data became an important support for the researchers' collaboration in data analysis through the knowing and re-knowing process (see Fig. 3.3). The two researchers dialectically supported each other to develop a deeper understanding of teachers' practice and children's learning within the Conceptual PlayWorld. After the second Conceptual PlayWorld session, researcher A briefly introduced how the second session went and told researcher B: "*I noticed two boys in this session. One is Liu, the boy who said he did the rainbow experiment, the other one is Lu, the boy who cried in the first session*". Researcher A helped researcher B to develop a basic sense of this activity. After carefully examining the children in the data, researcher B added her interpretation: "*I found that these two teachers have cooperated with each other very well, and they have demonstrated how they could use different positioning to promote children's concept learning*". As argued by Pavlidis (2010), dialectics as a way of thinking grasps and represents the developmental process of a concrete object in its interconnections with other objects. Following dialectic thinking, digital technology supported the two researchers' mutual dialogue and built the interconnections between the researchers through the knowing and re-knowing process.

In this chapter, the dialectical thinking brings the on-site and off-site research perspectives together as a synthesis in this collaborative experiment. Digital technology as a rational tool provides possibilities for both researchers to understand the research question within the cultural context, which promotes the *tool validity* (Fleer, 2014a) in the collaborative educational experiment. In addition, through digital technology, both of the researchers maintain the role of researchers and participants in the collaborative cultural-historical educational experiment. Particularly, the *ethical validity* of data is strengthened by the active relationships between the research fairy and children (Fleer, 2014a). Cultural-historical methodology seeks to understand a research question in relation to the cultural context (Fleer, 2014a). The knowing and re-knowing process illustrates two researchers within the same cultural community but take different perspectives in the data analysis process (on-site and off-site perspective), which promotes *cultural validity* in a dialectical way (Fleer, 2014a). Through digital technology, the two researchers are able to maintain relationships with the participants, and collaborate during the data collection and

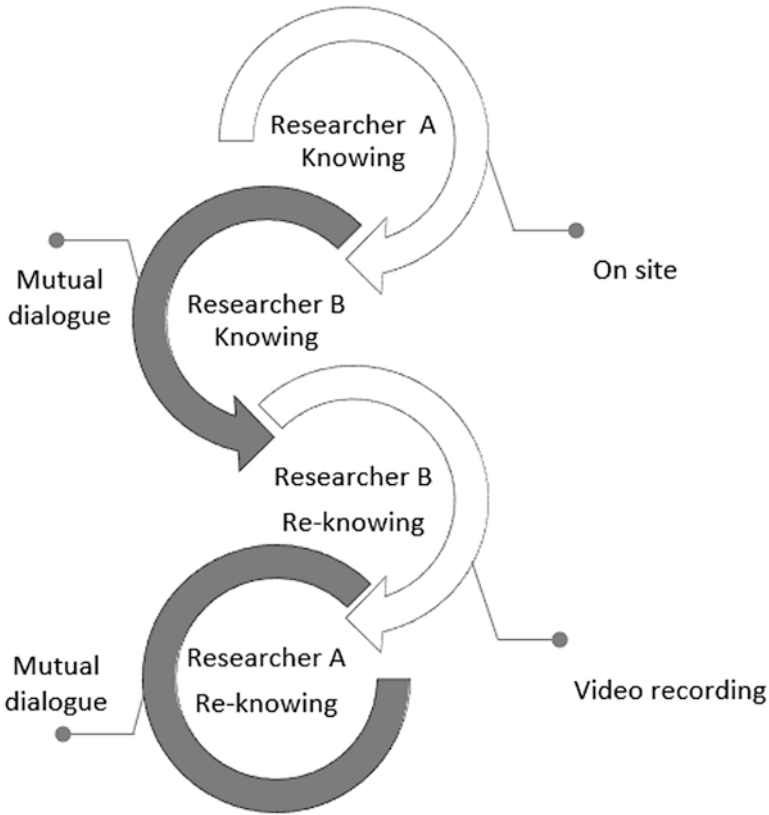


Fig. 3.3 The knowing and re-knowing process between two researchers

analysis process. In summary, this chapter presents a new perspective to conduct a collaborative educational experiment through digital technology with researchers on-site and off-site during the crisis of COVID pandemic.

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Chapter 4

The Individual and Collective Minds Behind the Role of the Educator-Researcher: An Integrated Educational Experiment



Xianyu Meng

Abstract An educational experiment was introduced by Hedegaard (Studying children: A cultural-historical approach. Open University Press, New York, 2008a) as a synthesis of pedagogical intervention and research method. The planned intervention is designed collaboratively between teachers and researchers to support children's learning and development. But what happens when the researcher also assumes the role of the educator? This chapter presents an example of an educational experiment that was undertaken individually by an educator-researcher. To support the educational experiment, a collective of PhD supervisors and the other intellectual colleagues acted as an expansive community that enabled theoretical discussions and data analysis to be performed at an interpsychological level. It was found that with digital video observation as the main research method, the dialectical relations between the individual and the collective created unique opportunities for the formation of the researcher's identity, as well as fulfilling the research aim of the educational experiment. Thus a new configuration of the educational experiment is proposed as an enabling research method, where an educator-researcher used digital video observations, and an expansive intellectual community for peer review.

Keywords Educational experiment · Educator-researcher · Digital video observation

4.1 Introduction

In a cultural-historical tradition, an experiment is regarded as a dialectical-interactive method through which an intervention is applied in practice as specific conditions for child development (Hedegaard, 2008b). Situated within the cultural-historical wholeness approach, an educational experiment is “a multifaceted planned

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preparation of teaching which has, as its goal, the creation of optimal conditions for the learning and development of the participating children” (Hedegaard, 2008a, p. 185). It consists of formulating and revising planned activities by the researcher and the teacher, where a theoretical problem, not just a problem of practice is considered. The researchers and teachers implement the planned activity in the class as a whole, and evaluate the children’s learning activities in relation to how this affects changes in the children’s motives, thinking, and knowledge acquisition (Hedegaard, 2008a). In other words, it is a synthesis of pedagogical intervention and research method, with the purpose of investigating how teaching activities as a planned pedagogical intervention impacts on children’s learning and development (Hedegaard, 2008a). In an educational experiment, study conditions are created to examine child development in a way that is “amplified in intensity and condensed in time and place” (Fleer et al., 2020, p. 49). It requires a theoretical system in addition to a planned pedagogical outcome, in other words, a key relation between practice and concepts (Davydov, 1998; Hedegaard, 2008a, b). This is where the fundamental difference lies between an educational experiment and action research (Hedegaard, 2008a). Action research is primarily a context-specific, “practice-changing practice” (Kemmis, 2009, p. 464), where an educator initiates changes in their own workplace in order to solve an existing problem at the local level (Cohen et al., 2018; Kemmis et al., 2014). In contrast, an educational experiment is primarily used to generate and develop theoretical knowledge, and does not aim to solve a specific empirical problem (Hedegaard, 2008a). It requires that researchers work together with educators in their planning and implementation of the teaching activities (Hedegaard, 2008a). Thus, an educational experiment is theoretically driven, relying heavily on the theoretical and dialectical knowledge of teaching, learning, and development (Hedegaard, 2008a).

The role of the researcher in the educational experiment, as an insider and outsider (Li, 2014), is consistent with a cultural-historical understanding of research, and where the researcher’s involvement and instructions are collected and analysed as data because these are “the decisive moment of the experiment” (Vygotsky, 1997, p.36). The researcher is situated inside the social reality of the teacher and the children, allowing for a better understanding about the process and conditions for development (Hedegaard, 2008c). In certain circumstances, however, instead of collaborating with educators, the researcher assumes an integrated role (Lewis, 2020) as the teacher-researcher. Research by Lewis (2020) and Meng et al. (2021) show that simultaneously working as the only teacher onsite and conducting research as the researcher offers a double perspective. It means one can be fully engaged in the everyday practices of the institutional setting as an educator, while undertaking data analysis and gaining understandings about the children’s development and play practices.

Being an educator-researcher is beneficial in a number of ways. First, the integrated role enables the researcher to offer expertise and intellectual resources when needed in the process, and to maintain collaboration and partnership with the other participants and stakeholders in the community, which is different from the more traditional research role (Berg & Lune, 2012). Second, being able to be fully engaged in the everyday life of the research context as an educator enables the

researcher to collect a lot of first-hand experience and deep insights into the motives, demands, practices, and perspectives in the research site. As Hedegaard (2019) suggested, the prerequisite for researchers to gain the child's perspective is to be fully immersed in the child's everyday institutional practice and activity settings. Third, being an educator-researcher means that trust has already been built between the researcher and the child participants well before data collection, which could reduce the intrusiveness that a stranger as researcher might bring, especially when vulnerable children are involved (Meng et al., 2021). Lastly, in studies where emotionally charged situations are an integral part of the research process, a well-established relationship between the children and the educator-researcher supports the children to feel safe, and helps the researcher notice and respond quickly and appropriately if a child has an emotional reaction.

Of course, this integrated role inevitably poses some special challenges that should be dealt with carefully and ethically, including potential conflicts of interest and power imbalances as the educator-researcher collects data in their workplace (Meng et al., 2021). Concerns can also be raised in terms of trustworthiness of the data (Meng et al., 2021). Although the collaboration appears to be conducted by the educator-researcher alone, in fact, the collaborative nature of the educational experiment is also shown through the active engagement of an expansive community of researchers in the theoretical discussions, data analysis, and even personal reflections.

Whilst an educational experiment offers unique possibilities and insights into children's learning and development, little is known about the educator-researcher's experience in the research process. Therefore, this chapter considers the conditions and crises of an educator-researcher in the process of undertaking an educational experiment.

4.2 Method Used

The educational experiment discussed in this chapter sought to discover how a playworld (Lindqvist, 1995) supported the development of emotion regulation in young children living in an institutional care setting in China. Data in this study were collected from a social welfare institute in a medium-sized city in China. The data-collecting researcher was also the only educator in the child-care programme under study (Meng et al., 2021). During the 10-week educational experiment, a playworld was implemented, where the educator-researcher with ten participating children and five staff members (three caregivers, one physiotherapist, and one manager) assumed a play role based on the children's book, *My Little Bunnies*, and played together in jointly created imaginary situations. More specifically, based on the knowledge about the children's competencies and interests, as well as the everyday practice of the institution, the educator-researcher designed three different variations of the playworld. They included: a pop-up (Fleer et al., 2022) pretense practice during the evening circle times, a focused play sessions for a small group of children (while the others were receiving special care), and a full-scale playworld. Then, during implementation, the educator-researcher was fully focused on her role as the educator so

she could model and lead through her play role. Meanwhile, data were collected through digital video observation as is now discussed.

In this study, two cameras were employed as tools for digital video observation, and their positions are illustrated below in Fig. 4.1. First, a GoPro was fixed onto the wall to capture what was happening in the whole Activity Room, where the children spent a large part of their waking hours. Designed as a wearable action camera, a GoPro is conventionally used to record still and moving images during sports. In this study, however, it made data collection possible when no research assistant was allowed inside the institution and no safe spot was found for a handheld camera on a tripod anywhere in the activity room. It allowed the educator-researcher to be fully present with the children and the caregivers/educators, and to collect data for analysis as a researcher. As the GoPro also captured the educator-researcher as part of the children's social situation, it enabled her engagement in the teaching process to be included in the data for analysis too. The other camera used in the study was a handheld digital video camera, mounted on a tripod for focused play sessions in the children's bedroom, and held by the educator-researcher during outdoor play.

After data collection was completed, data were discussed and analysed systematically by the educator-researcher and her three PhD supervisors, and each meeting was audio recorded with the supervisors' consent and transcribed for further reflections. Peer reviews of the data analysis were also provided regularly by the Conceptual PlayWorld research team and the wider cultural-historical research community at the faculty. Different aspects of the data and their analysis were presented and critiqued during the monthly PhD day meetings, as well as cultural-historical seminars, workshops, and conferences, such as the International Society for Cultural-historical Activity Research (ISCAR).



Fig. 4.1 Positions of the digital video observation tools in relation to the layout of the unit

4.3 Example of Data Generated

The vignette below shows how, with the help of digital video observations, a shared understanding of “chaos” in the playworld was achieved interpsychologically, which supported a renewed interpretation of the data set for the educator-researcher. It is excerpted from the first meeting with the PhD supervisors after the educator-researcher came back from data collection. Before the meeting, the educator-researcher was in an “intellectual crisis” and planning on withdrawing from her study, because she believed the playworld implementation was a total failure, messy and chaotic. During the 2-h discussion with her supervisors, she started to understand and even appreciate the “chaos” as a developmental force for her own understanding of the practices and traditions in which she was acting as a educator-researcher.

At the beginning of the meeting, the educator-researcher explained the everyday practice of the research site, and the medical backgrounds and personal history of the participating children. She shared a video clip from the first few sessions of the playworld, where the children were unable to get into their play roles. She was frustrated because the children’s responses were not what she had imagined, nor was her playworld as organised as those implemented by educator-researchers elsewhere, such as Lewis’ (2020). She said, “My playworld is totally *chaotic*, it’s hopeless.” On hearing this, Marie commented, “*Chaos* doesn’t mean hopeless.”

The educator-researcher continued showing different scenes in the video and talking about how the children often appeared out of control and were unable to carry out any play pot during a playworld session.

Marilyn said, “It will always be *chaotic*, because you have got children with models of practice in their head which was totally [different from children living in family homes]. But it is what they do and what they consider as everyday life and practice ... So that’s what they are bringing to us. So of course it’s always challenging space for you as the educator, because they are never going to respond in relation to how Rebecca’s children respond... They are responding with what they see around them. That’s all they can bring to this, because that’s their world...”

Marie added, “You are absolutely right. It’s *their* real world. It’s *chaotic*. So of course the playworld is going to be *chaotic* by definition.”

This first discussion about “chaotic” helped the educator-researcher realise that “maybe being chaotic is a must, a characteristic of the playworld for the children” in her study. As she showed her supervisors more video clips, Marie discussed the meaning of “chaotic” further, “I think when you talk about the *chaos*, I’m really interested because you keep saying it’s *chaotic* in the playworld, but I don’t think it is *chaotic* at all. I think the *chaos* is in the tension between what you thought it’s going to be, based on what you have observed in how was Rebecca’s playworld and Marilyn’s, and the reality of the playworld. But the playworld that you have created, I think is every bit as rich and organised, given the context. So I think it’s correct to make that distinction. Give yourself a break, apart from anything else, and not beat yourself up, because I think it’s every bit as organised in that way. Even what these children bring here, bringing different reality, and bringing in different life experience to it. But they are still doing it. See how the children do.”

What the supervisors brought to light is that “chaotic” signifies the discrepancy between the educator-researcher’s initial understanding of an “ideal” playworld and its real form in her study. The understanding of “chaos” shared intersubjectively inspired the educator-researcher to look at the children’s life and their original institutional practice to understand children’s initial reactions to playworld. Thus, to the educator-researcher, the word “chaos” stopped carrying a negative implication, but was representative of the children’s relations with the unique social situation of an institutional care facility. Collectively, the supervisors and the educator-researcher started to reveal how the implementation of the playworld stirred up drastic changes in the children’s relations with their social environment, and how development might emerge through “chaos”.

The educator-researcher reflected, “As playworld continued, I realised that maybe they didn’t know what to do with this freedom, because in their life, it is very structured, very restricted and not much choice. So when playworld gives them so much freedom, so many possibilities, they are lost. ... Therefore smaller doses of the playworld too.”

To this, Marilyn said, “That can be part of your new model of playworld...what you have just described is in the literature in other institutions, where people change pedagogical practices for students because it’s suddenly not what they have expected, and they don’t know how to do it yet. But the repetition of what you are doing gives them the context in which to build... you are building a safe structure of a playworld for them. The storyline gives the narrative that is safe, and within that they then feel safe to actually explore the challenges they bring into it...”.

In this vignette, the shared viewing of the playworld through digital recording and the intellectual discussions together supported the educator-researcher to reconsider her research model not as a failed attempt, but as generating unique outcomes because of the unique social situation.

4.4 Conclusion

This chapter presents a new way of conceptualising the role of the researcher in an educational experiment. The method includes an individual educator-researcher, digital video observations, and an expansive community of cultural-historical researchers (see Fig. 4.2). The current study furthers Lewis’ (2020) integrated educational experiment by foregrounding the use of digital video observations and the important contribution of an expansive research community. Digital video observations allow for *shared viewing* and *re-viewing*, which enables co-experiencing of what happened in the playworld. This makes it possible for the expansive research community to provide insights and different perspectives for the educator-researcher. The educator-researcher was able to interact intellectually with an expansive community of cultural-historical researchers. The intellectual exchanges, as illustrated in the vignette, shows how theoretical discussion and data analysis on the

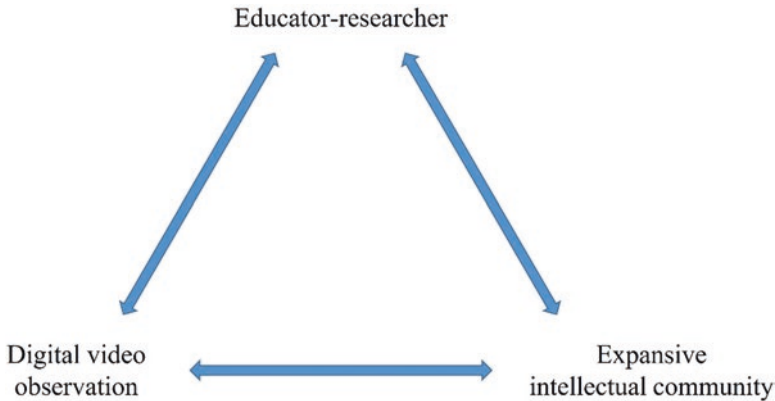


Fig. 4.2 A model of an integrated educational experiment

interpsychological level enabled the educator-researcher to have a renewed understanding of the data set at an intrapersonal level. As the individual and collective minds interact, the educator-researcher was able to re-experience the critical moments of the playworld through the video clips with a deepened theoretical understanding about the data. It reshapes the educator-researcher's understanding about the research outcomes, and enabled her to answer the research questions of the original study. For the educator-researcher, this new model of the educational experiment also creates conditions for the renewal of her identity as a researcher, which, in turn, empowered her to continue, and eventually complete, her PhD project.

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Chapter 5

Researcher Inside a Diorama: A Digital Educational Experiment in Everyday Practices



Monique Parkes

Abstract Young children develop conceptual understandings in science from early infancy and through involvement in various institutions and activity settings. Daily interactions with peers, families, care givers, early childhood educators and teachers create conditions for young children to enhance their conceptual learning and theoretically model their understandings. However, not enough is understood about how children 5 years and under use theoretical modelling to represent their thinking in science. Recognising this gap necessitates research that applies suitable tools and, a methodology to capture and understand young children’s scientific concept formation and theoretical modelling. This chapter will discuss the use of digital methodologies and multiple strategies initiated during the Covid19 crisis. These include dioramas, drawing, and three-dimensional modelling in an educational experiment to gain deeper insights into the theoretical modelling of young children in early childhood settings involving the scientific concept of light. Importantly, the advantageous use of digital tools will be explained as a method enabling researchers to actively apply other creative tools and to participate in the children’s activity settings towards the acquisition of authentic data for analysis.

Keywords Educational experiment · Digital tools · Dioramas · Drawing · Crisis and social situation of development

5.1 Introduction

The involvement of young children with digital technologies is contentious with suggestions of digital tools having a broad range of negative outcomes for young children (Howie et al., 2017; Vedeckina & Borgonovi, 2021).

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Contrary to this conception is a shift from narrow perspectives towards young children's engagement with technology, to an exciting and broader definition of digital technologies as part of a young child's complex ecological learning system (Arnott, 2016). Other research has also shown that digital tools and technologies can support imaginative play by acting as *digital coadjuvants* in ways that enhance existing pedagogical preschool practices (Fleer, 2020).

These contemporary views give rise to transcending beyond the binary of digital and non-digital (Fleer, 2019a; Rai et al., 2022) to accepting the prominence of digital technology in young children's lives with careful consideration of the conditions 'by and with' young children interact with such technologies (Mantilla & Edwards, 2019). This chapter further demonstrates how multiple digital tools used as methodological choices, initially spurred by the Covid19 pandemic created a new and innovative way for the continuation of research during times of crisis. Adopting an educational experiment: Fleer's Conceptual PlayWorld model and a diorama, this cultural historical study was designed to intentionally teach young children the scientific concept of light, whilst offering opportunities for the children to model their theoretical understandings. Fleer's Conceptual PlayWorld (2019b) is a model designed to intentionally teach young children science, technology, engineering and mathematics (STEM) through imaginary play.

The original study design involved the use of several digital cameras, placed statically on tripods and dynamically hand held by the researchers to follow the participants. Following growing concern over Covid19 infections government interventions immobilised researchers from being on site in early childhood education and care institutions. This critical situation and subsequent crisis provided the impetus for the Conceptual PlayWorld digital diorama.

As Dafermos (2022) argues historic times laden with critical episodes and crises promote the need for transformative practices, creating new conceptualisations supporting human development. Discussing crisis in relation to children's development Vygotsky (1998) theorised critical periods as dialectical processes of revolutionary, transitional paths. In consideration of these authors writings on crisis it is possible to form understandings of the way in which crises underpin the emergence of new methods. As a result, the new methods develop in response and if effective these responses may replace or be in addition to previous systems.

Whilst the Conceptual PlayWorld digital diorama was created in response to the crisis associated with the Covid19 pandemic for the continuation of research, the use of digital tools and digital methodologies was recognised as effective in times of 'lockdowns' and at other times. This is because multiple digital technologies and tools afford a flexible approach enabling researchers and the participants to readily come to together virtually. For example, at each stage of this study the participants and researchers were able meet despite being restricted in different locations, and the various digital tools recorded multiple perspectives which could be re-visited and analysed. In particular the Zoom platform was a prominent digital technology used at the time for the researchers, educators and teachers to plan the educational experiment intervention.

This was followed by daily Zoom sessions in the classroom using an iPad placed inside a diorama to initiate the sessions in an engaging way for the children and educators participating. The researchers were able to Zoom into the sessions with the participants and take on dual roles; that of researcher and of an imaginary character in the Conceptual PlayWorld. Post intervention interviews were then carried out via Zoom and recorded, giving the educators involved an opportunity to reflect on and express their experiences of the digital intervention (Figs. 5.1, 5.2, and 5.3).



Fig. 5.1 Researcher greets the children and educators to begin the session inside the diorama in character as a wise octopus



Fig. 5.2 Children draw pictures about visibility (the absence and presence of light)



Fig. 5.3 The end of a day's session, children draw as researcher interacts

5.2 Background to the Creation of the Diorama

Following a series of recorded Zoom meetings between the teacher, educators and the researchers the Conceptual PlayWorld digital diorama was developed. In accordance with the Conceptual PlayWorld model, the planning followed five steps (Fleer, 2019b). Adaptations to the story of the Rainbow Fish (Pfister & James, 2007) were introduced along with the science concept of light. The lead researcher, using recycled materials made the diorama and artefacts which were given to the centre for the children to unwrap via a contactless delivery, appropriate to the Covid19 restrictions in place at the time. Digital cameras, iPads, tripods and other filming equipment were also delivered by the lead researcher to the centre.

The teacher filmed the children opening the diorama, this initial introduction to the study was also recorded as part of the data collection. In addition, the lead researcher had recorded short videos on the iPad that was delivered to the centre as provocation for each aspect of light that was being introduced to the children in the Conceptual PlayWorld. This provided a backup to the Zoom sessions if connectivity was interrupted during the sessions and could also be played to the children at other times to inspire imaginary play in the Conceptual PlayWorld.

The diorama was designed and intended to offer the children multiple affordances in service of their Conceptual PlayWorld, exploring the science concept of light. Firstly, as a provocation for the children's imagination and storytelling whilst exploring various aspects of light and secondly, as an appealing space for the iPad to be placed with the researchers Zooming through at the beginning of each session. The Zoom feature of a virtual background also made it possible for the researchers to appear as if inside the diorama, through a series of photographs taken of various settings within the diorama before it was delivered. Dioramas offer a plethora of opportunities for children to invent and re-tell stories (Cools et al., 2017) as well as to create their own characters and artefacts. The children involved were encouraged at the end of each session through an iterative process of design, discuss, draw and model to create artefacts related to the aspect of light that had been introduced in the Conceptual PlayWorld that day (Table 5.1).

Table 5.1 The use and affordances of digital tools and technologies

Stage	Participants	Digital tools and digital technology	Affordances
1. Planning the conceptual PlayWorld	Early Childhood Teacher (ECT) Early Childhood Educators (ECE)	Zoom	The teacher and educators were able to meet with the researchers to plan the conceptual PlayWorld in times of government ‘lock downs’. *All Zoom meetings and sessions were recorded
2. Implementation of the conceptual PlayWorld	ECE’s and focus children	Zoom iPads Digital cameras for videoing and photographing scanners and email	The researchers could be virtually present with the children and educators to implement the educational experiment. Zoom sessions and multiple cameras captured the children’s voice, embodiments and gestures throughout all stages of the conceptual PlayWorld. This included the imaginary play, exploration, and as the children theoretically modelled their understandings through the iterative processes of drawing and making models. The multiple cameras on tripods and hand held made it possible to capture different perspectives that the researcher was later able to watch and analyse. The children’s drawings could be photographed, scanned and the images emailed to the lead researcher.
3. Post intervention Interview and reflection	ECE	Zoom	The researchers were able to interview a participating educator about the intervention and, she was able to share her perspectives on the educational experiment.

5.3 Discussion

This chapter has highlighted the use and multiple affordances of an array of digital technologies and tools during an educational experiment in times of a crisis and how such a crisis illuminated the many benefits of the digital methodology. Hedegaard and Fleer (2008), explained specific to an educational experiment must be a planned intervention that addresses theory and ultimately aims to increase the participating children’s learning and development. Furthermore, a cooperation between the educators and researchers must be established and maintained throughout the educational experiment in support of a shared theoretical foundation and intended direction for the children involved (Hedegaard & Fleer, 2008).

As shown in the example preliminary and continual dialogue and planning was undergone using digital technologies and platforms throughout all stages of the aforementioned educational experiment. All stages were recorded enabling conversations to be revisited for further clarity and later analysed, therefore it could be argued that the digital recordings for example, from Zoom sessions increased the understanding and interactions between the educators and researchers because the dialogic exchanges extended beyond being virtually present.

An important aspect of the study was that the use of multiple cameras, both static and hand held along with the Zoom recorded sessions revealed multiple perspectives and highlighted the children's social situation of development. The social situation of development as theorised by Vygotsky (1998) describes a vigorous period between the child and their social reality and the path where the social becomes the individual, encompassing a holistic view of the child throughout different age periods. Additionally, the social situation of development represents complex qualitative changes occurring in children's lives and, these complexities as a whole comprised of units preserve the emotional experiences and the systems of connections within this whole (Bozhovich, 2009; Ma, 2020).

During the study the participating children's unique social situation of development could be seen through their involvement interactionally, dramatically and via their drawing and modelling activities within the Conceptual PlayWorld digital diorama. The children were for example, accustomed to digital communication, whilst it is not possible to know exactly whether this had been amplified by the Covid19 restrictions disabling many social gatherings, it was clear that for the 4-year-old participants speaking and seeing someone through an iPad was not novel. In fact, one child asked the researcher "Are you actually Facetimeing?"

On another day during the educational experiment the lead researcher was placed via Zoom on the iPad inside a cave that had been made with dark material and a table for the children to explore the absence of light. Throughout the whole session in the cave the children played imaginatively and explored aspects of light with the researcher virtually present. What this example shows is that the involvement of the technology did not distract the children from the intentions of the educational experiment, rather the digital technologies enhanced the affordances. The researcher's virtual presence was easily facilitated because of the limited space available in the cave, which in person may not have been possible. Therefore, the nuanced use of digital tools made it possible for the researcher to be comfortably inside the cave with the children for the whole duration, interacting with and observing the participating children in their activity setting.

In considering the child's social situation of development attention must be drawn to the child's perspective within their everyday institutional and activity settings, this requires understanding the child's own motives and the various demands placed on the child within their settings (Hedegaard, 2020). Through the multiple cameras that filmed the daily Zoom sessions it was possible to capture the unique aspects of the child's social situation of development, connected to the motives, the demands of the educational institution, and, the perspectives of the children and educators. This for example was seen during a story book reading session where the demand placed on the children was to sit and listen however, the children's

motivation was to play. In this video recorded example the different perspectives, motives and demands can be seen of both of the children and educators. What this example further demonstrated was how conflict between motives and demands arises in the institutional setting and the importance of honouring the child's perspective in their activity setting by re-evaluating the educational and institutional intentions. In capturing these authentic moments of tension through the digital methodology and tools it is possible to deeply analyse the perspectives at the time.

5.4 Conclusion

Propelled by the conditions of a crisis new methodologies were needed to continue research. This chapter has demonstrated a shift in perspectives, to thinking about digital technologies and young children beyond the divisive binary of digital and non-digital (Fleer, 2019a; Rai et al., 2022). This change in perspective and the use of digital tools and technologies has been presented through a new and innovative way in which technologies were used with an educational experiment: Fleer's Conceptual PlayWorld and a digital diorama. Rather than engagement of digital technologies and young children portrayed as passive and as 'digital babysitters' (Lindeman et al., 2021) this chapter highlights the agentic (Fleer, 2019a) and interactive affordances of a digital methodology. This was illustrated throughout all stages of the study with all the participants as they actively engaged with the researchers using digital tools via the Zoom platform.

Furthermore, whilst the Covid19 crisis provided the impetus for the methodology what was discovered through the methodological affordances of this digital approach is the many benefits of the virtual technologies, in particular Zoom. Using this platform highlighted the flexibility of coming together readily and it is anticipated that this approach will continue to be a methodological choice in future studies. This is because future study designs can include hybrid versions using digital dioramas whereby the children and educators can Zoom in at their own flexibility to share aspects of their Conceptual PlayWorlds with the researchers. The physical size of an iPad also means that the researcher can be placed in spaces with the children that may otherwise not be possible, particularly during imaginative play under tables transformed into dark caves. Therefore, the changes brought about by the crisis have paved the way for new research methods capturing multiple perspectives and in support of studying children's scientific concept formation and theoretical modelling.

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Chapter 6

Early Childhood Teachers' Professional Development: The Hybrid Educational Experiment



Liang Li

Abstract In recent years, particularly in the ‘new normal’ period, social media has been widely used as a vital part of professional learning and communication. Nevertheless, there is limited research on educational experiment in terms of how social media-based professional development can be promoted to support physical meetings for teacher professional learning. We examine the functions of social media, such as WeChat, in the hybrid educational experiment, using Vygotsky’s ideas of social situation of development and crisis and Edwards’s concept of relational agency. We engage in theoretical discussion through the analysis of illustrative vignettes from the previous study conducted with three kindergarten teachers in different facilities in China. We argue that the hybrid educational experiment through social media (e.g., WeChat) and face-to-face professional development training creates motivating conditions to support teachers’ meaningful professional development and promote professional agency. The hybrid educational experiment also enables researchers to understand the process of teachers’ professional development and traverses the complex, shifting and uncertain areas of pedagogical roles and practices. The study reveals that engaging with social media (e.g., WeChat) provides the research foundations to capture teachers’ professional agency in a new way and process teachers’ sustainable professional development in play-based learning programs.

Keywords Educational Experiment · WeChat · Professional Agency · Professional Development · Social Situation of Development

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6.1 Introduction

With the advance and popularity of information and communication technology, social media has become a prominent digital technology used for the purpose of global digital communication (Luo et al., 2020). There is an international trend of researching the emergence of social media within the past few decades to investigate the possibilities and opportunities that social media offers for learning and professional development (PD). In the ‘new normal’ period, owing to the COVID-19 pandemic, social media is widely used as a vital part of professional learning and communication. Nevertheless, missing in the literature is how social media has become a new way to research early childhood teachers’ sustainable PD. social media-supported professional learning is still in its infancy (Luo et al., 2020). Traditional forms of PD include teacher participation through face-to-face conferences, training sessions, workshops and focus group discussions. Thus, PD may become time consuming and costly owing to the formal learning process (Francera, 2020). Further, the researchers wonder how the learning process can become personally meaningful for teachers and ensure that teachers find value in their learning (Rehm & Notten, 2016; Durksen et al., 2017). Thus, social media-based PD has been promoted to reduce the cost and time associated with traditional forms of PD and create a flexible learning space and personalised PD content, thereby meeting the needs of teachers (McNamara et al., 2021; Francera, 2020; Prestridge, 2019; Prestridge & Main, 2018; Carpenter & Krutka, 2014). WeChat, a public social media platform, has been used in China since 2011 (Statista, 2016). It offers text messages, hold-to-talk voice messaging, video conferencing, and sharing of photography, videos and location. WeChat has also been used as a mobile payment application (app) and social media platform; it can be identified as an app for everything and a ‘super app’ owing to its variety of functions. Recent studies have explored the functions and role of WeChat in the educational research, including building an online community of practice to support teachers’ professional learning (Xue et al., 2021); exploring language teachers’ PD through the WeChat group (Qi & Wang, 2018); investigating early childhood teachers’ engagement in WeChat-based communities; and contributing to better practice for PD engagement (Zhou et al., 2022). Research has shown that social media-based PD has promoted participants’ sense of belonging because they share concerns and exchange knowledge on a set of problems in the context of ongoing communication through unsynchronised engagement in the online communication (Zhou et al., 2022; Xue et al., 2021). However, there is limited research on how WeChat-based PD can be promoted to support physical meetings for teachers’ learning and development (Xue et al., 2021).

Owing to the impact of the COVID 19 and the researchers’ overseas location, this study used WeChat as a research tool to communicate with teachers and provide online professional engagement throughout the educational experiment. This chapter explores how WeChat, as a premier social media platform in China, aligns with face-to-face communication, creates motivating conditions to promote early childhood teachers’ development and professional agency.

6.2 The Hybrid Educational Experiment

To investigate how early childhood teachers engage with curriculum reforms in China, we designed a study that brought researchers and teachers together to focus on the central problem of how to bring play practices into teaching programs. We drew upon Hedegaard's (2008) educational experiment as the key methodology. An educational experiment is a collaboration between researchers and teachers to solve a theoretical problem, not a problem of practices. In this educational experiment, we focus on the theoretical problem of how play could be the core dimension of the curriculum to meet the demands of curriculum reforms and the Chinese Government (Li et al., 2022).

An educational experiment as a methodology was conceptualised from within cultural-historical theory (Vygotsky, 1997). The central cultural-historical concepts important for our educational experiment are derived from Hedegaard's (2008) wholeness approach. In a wholeness approach, societal values (curriculum reform), institutional practices (need for play in teaching programs) and personal motives of teachers (how to bring play into a learning program) are studied relationally. Teachers enter the activity settings of the new practices. Through the educational experiment, with its focus on the theoretical problem of how to bring play into learning, teachers and researchers as collaborators study the new demands and change in teacher motives. For the purpose of the study, Fleer's (2018) Conceptual PlayWorld (CPW) has been applied to bring the possible intervention for the practice changes.

Because the researchers are overseas and in light of the pandemic (in the later stage of data collection), travelling was a challenge during the data-collection period. A hybrid (online and onsite) educational experiment was applied in this study to address the research aims. The digital mode of educational experiment, using WeChat, led collaborative actions while supporting teachers' ongoing PD. In this chapter, we focus on the exploration of the WeChat-based hybrid educational experiment and explore how it creates the conditions to promote teachers' professional agency and expertise in the implementation of the CPW.

6.3 Overview of Research Context Over the Hybrid Educational Experiment

The hybrid educational experiment took place within three public kindergartens, in Chengdu, Guangzhou and Beijing, respectively. For this chapter, three focus teachers (Teacher Jing, Teacher Li and Teacher Chen) were selected to illustrate their PD experience. All three teachers had a Bachelor of Early Childhood Education. Teacher Jing had seven years' teaching experience and Teacher Li had eight years of experience. Teacher Chen had 10 years' teaching experience. In this project, we followed three teachers for over 1.5 years. Ethics approval was received from the

researchers' university (Project ID: 7851), and full informed consent was obtained from teachers, and the principles of the kindergartens for the use of data collected in the field of education and research. Pseudonyms were applied to protect the privacy of the participants.

6.3.1 Face-to-Face/Onsite Professional Training Workshop

A two-hour face-to-face professional training workshop was developed with the focus group teacher to discuss the concept of play and learning and the new practice (CPW approach). The workshop was digitally video recorded.

6.3.2 Video-Based Observation

Along with the workshop, researchers captured three hours of videos of current teaching practices and teacher–child interaction before the implementation of the invention to establish Period 1 baseline data. A selected video clip was used as a prompt to support the reflective pre-interview with the teachers to learn their views of play and learning. In Period 2, the implementation of the CPW was video-recorded by researchers (if the researchers were onsite) or teachers. A total of 136 hours of digital video observation was collected.

6.3.3 WeChat-Based Researcher–Teacher Conversation

Over the period of the educational experiment, to better support teachers' continuing PD, the WeChat group was established to enable ongoing conversations between researchers and teachers. Teachers digitally recorded their interventional CPW activity settings and uploaded them to the WeChat group, which informed the online discussion. The researcher–teacher conversation was generated as part of educational experiment in this study. In this chapter, the focus is the WeChat-based hybrid educational experiment to promote teachers' development.

The characteristics of the WeChat-based hybrid educational experiment create possibilities and motivating conditions in promoting early childhood teachers' professional agency in their intervention.

The hybrid educational experiment promoting teachers' relational expertise.

The research began with the initial early stage of establishing the online communicative platform—WeChat group—and building a close relationship through conversations related to participants' relational expertise in the new practice. In promoting teachers' development and capturing the developmental process, the researchers used the WeChat Group as a channel to communicate with the teachers

related to their challenges and negotiated conflicts or concerns while implementing the intervention. Figure 6.1 shows their willingness to share concerns with the researchers via the WeChat group whenever needed, thereby creating common knowledge of the new practices to meet policy demands in play-based learning.

As argued by Edwards (2011), ‘relational engagement with the knowledge and motives of others can produce a form of common knowledge which comprises a partially shared understanding of what matters for other contributing experts’ (p. 39), thereby creating responsive professional actions. In this case, common knowledge of new interventional practice was created through the WeChat group discussion because it offers space to share concerns and exercise relational agency. WeChat group discussion provides educational affordances through the exercise of relational agency. First, Teacher Jing recognised her professional expertise in practice and realised the demands posed by the CPW approach in changing her role from teacher to play partner. Second, Teacher Jing shared her concern about an aspect of the implementation of the CPW related to the role of the teacher; she understood her classroom children very well. Through the timely response of the researcher, Teacher Jing built her relational agency, which included her own core expertise and additional expertise. In-depth communication was afforded through the WeChat group because it enabled the teachers to discuss the challenges with the researcher on the basis of confident engagement and enhanced their theoretical understanding of the child development. Authentic educational collaboration was shaped to transform professional learning because both the teacher and the researcher recognised and responded to the offerings of others in the system of the new practice. Furthermore, the WeChat communication built a trusting relationship between

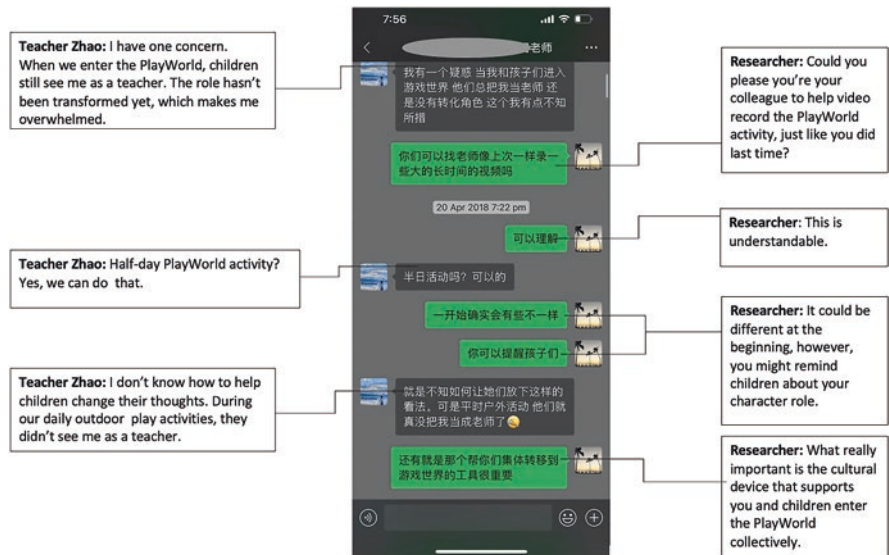


Fig. 6.1 The relational expertise formed through WeChat discussion

the researcher and teachers, which enhanced the face-to-face professional discussion. As commented by Teacher Zhao in her reflective interview:

The whole educational experiment is a slow learning process towards the new practice. I found myself only very interested in the Conceptual PlayWorld approach at the beginning, but with a lot of concerns and questions to implement it. Via the collaboration through WeChat and face-to-face sessions, I found I was able to master some foundational teaching methods. Then at the final stage of the experiment, I became more creative and was able to dramatise the conceptual problem. So, I believe for me, it was a great, slow but meaningful professional learning towards the new practice. (Interview, Teacher Zhao, 28 May 2020)

Teacher Zhao's reflection of this practice highlights her slow and meaningful learning practice. One of the features of building and forming the basis of common knowledge is to create and develop better tools for collaboration (Edwards, 2011). In this case, the hybrid educational experiment (WeChat-based and onsite meetings) drove the process of collaboration between the teachers and researchers. It aligns with the argument of Edwards's (2011) ideas of common knowledge, and the exercise of relational agency supports the understanding of motives in inter-professional working practices. The collaboration through the hybrid educational experiment not only promoted the professional agency but also motivated further exploration of the new professional practices (although it was a slow process).

6.3.3.1 Hybrid Educational Experiment Creating the Social Situation of Development

The WeChat discussion was part of the teachers' social situation in relation to PD. WeChat created motivating conditions to promote collaborative acts and sustain relational expertise, thereby building common knowledge in the implementation of CPW in their kindergarten practices. Within this process, a collective social situation for the teachers was formed through the supportive relationships in the WeChat group. Through the formal PD training, Teacher Li was slightly concerned about developing a CPW in her classroom because she encountered challenges in choosing mathematical concepts to dramatise the problem to be investigated in the CPW. The follow-up WeChat discussion increased her confidence to overcome the challenges, as shown in Fig. 6.2.

Vygotsky (1997) explains how and why there is a qualitative change in the psychological structure, stating 'The social situation of development represents the initial moment for all dynamic changes that occur in development during the given period' (p. 198). In the social situation of development, the contradiction between the individual's needs, desires and capabilities, and the demands and possibilities of the environment as a moving force drives the development (Chaiklin, 2003). This can also be recognised through the engagement of teachers and researchers in this study. Such online communication was of great importance when the researcher and teacher were not able to physically meet onsite. The educational demand can still be made through the WeChat discussion in a timely manner. For instance, in Fig. 6.2, Teacher Li was motivated to discover more relevant teaching content in



Fig. 6.2 Collective social situation

mathematics (e.g. PCK documents) to inform her implementation of the new practice. Reassurance from the researcher motivated her to continually conduct the educational experiment. As indicated in the findings, the teachers applied what they have explored through collaborations with researchers in WeChat, to their own teaching practice, thereby helping them enhance their teaching outcomes. The theoretical problem of how to bring play into learning has been explored over the educational experiment. The hybrid communication assisted the better quality of professional development as it strengthened teachers' theoretical learning and practical knowledge that developed in their own experience (Chen, 2008), to a large extent, transformed their teaching practices. Furthermore, through the online conversation, the participating teachers reflected their Conceptual PlayWorld teaching practice and shared their concern of whether they should directly tell the answer of the conceptual problems to the children when they observed the children's challenges in solving the problem (see Li et al., 2022). They worried that they could not meet their teaching goal in their lesson as children could not solve the problem themselves by using the concepts. Meanwhile, to some degree, they did not believe that the children had the enough capacity to solve the problem through the exploration within Conceptual PlayWorld. It can be noticed that they experienced a conflict between the demands to the new approach in child-centred practice and their traditional pedagogy in direct instructional teaching. Through the hybrid educational experiment, under the support of researchers, the teachers addressed the challenges and coped with the conflict. They realised there is a great need to shift their pedagogical practice, understood the change to impact children's learning, and built up their new teaching knowledge through the implementation of Conceptual PlayWorld. As argued by Defermos (2022), the conflict the teachers experienced, might not be

something negative or positive itself, but “a critical moment of a dynamic, contradictory, development process” (p. 6).

We argue that the hybrid educational experiment ensures opportunities and possibilities that contribute to the growth of teachers. Teachers and researchers shared a common goal in the implementation of the new practice. By using the WeChat group as an informal method and formal face-to-face PD training to mediate each other to engage in conversation, they achieved their goal. In addition, WeChat as a social media platform overcame the geographic, temporal and economic barriers, which supports the hybrid educational experiment to ensure continual collectiveness between researchers and teachers. In alignment with the argument by Stetsenko (2012), through the active engagement in the collaborative transformative practices with researchers by hybrid educational experiment, teachers learn and develop to transform their practices within their own social situation, thus supporting their professional growth.

6.3.3.2 Hybrid Educational Experiment Supporting Researchers to Revisit and Discuss Critical Reflective Moments with Teachers to Develop the Transformative Practices

Previous research of teachers' PD in early childhood education has focused on professional in-service training, follow-up consultations or critical reflections (Fonsén & Ukkonen-Mikkola, 2019; Jensen & Iannone, 2018). Conversely, this study found that PD training requires ongoing collaboration and collective reflections between teachers and researchers through shared understanding of the intervention to stimulate teachers' professional inquiries. The power of collaboration through different platforms (e.g., WeChat or onsite) provided the collective social situation for teachers to address conflicts or concerns in the innovative practices, as shown in Figs. 6.2 and 6.3, thereby enabling a deeper understanding of the intervention, avenues of interpretation and the ability to create qualitative changes in teaching. Furthermore, the hybrid educational experiment enabled researchers to understand the process of teachers' PD and traverse the complex, shifting and uncertain areas of pedagogical roles and practices.

To better understand the challenges Teacher Chen faced, the researcher and teacher revisited and reflected upon her previous practice. The reflective conversation through WeChat supported Teacher Chen to understand the meaningfulness of the new practice by emphasising the process of problem-solving instead of focusing exclusively on the correct answers to the problem. Critical reflection was formed. Figure 6.3 shows the mutual practice that demonstrates the appreciation and reflections on the collective acts and strengthens the purposeful response. As commented by Principal Qian from Teacher Chen's kindergarten at the post interview:

I feel that after the first training [onsite], teacher might just have an initial impression of the PlayWorld. Therefore, the following communication and collaboration helps Teacher Chen a lot ... I feel this kind of training process is very rare. Therefore, we do appreciate the guidance and help you provided to Teacher Chen. (20 June 2020, post interview)

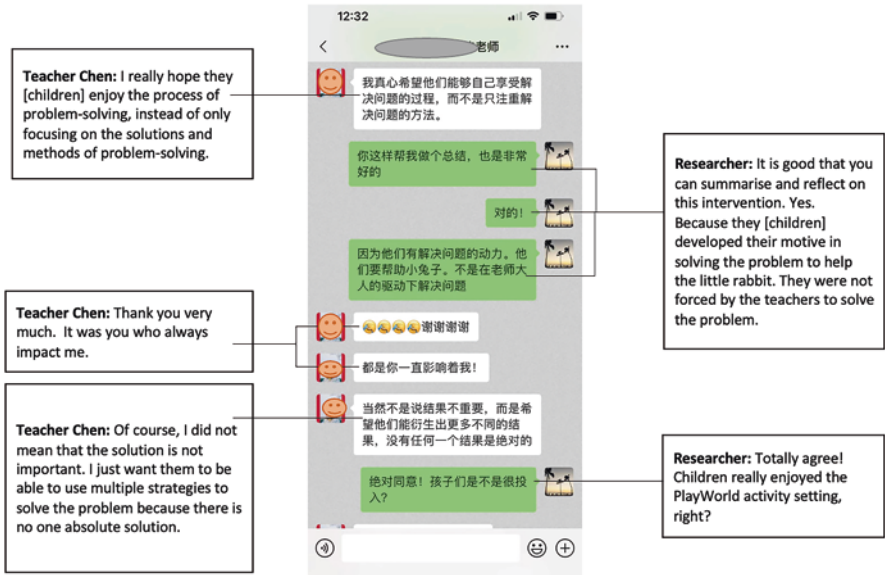


Fig. 6.3 Critical reflective moments between teachers and researcher

Principal Qian valued the process of the educational experiment and observed the growth of Teacher Chen in this project. The hybrid educational experiment created a process that supported the researchers to identify the teachers' PD, making visible their purposeful and meaningful educational intervention to solve the theoretical problem. Vygotsky and Luria (1994) suggest that 'we were studying on and the same activity each time in its new concrete expressions, but that, over a series of experiments, the object of research changed' (p. 144). In studying teachers' PD process, the conditions and their growing capabilities are always in the process of the development. Thus, the WeChat and video-recorded onsite professional training and conversations within the digitally recorded educational experiment enabled the researchers to capture the changes and teachers' developmental process of transformative practices.

This study reveals that engaging with social media (e.g., WeChat) provides a foundation for researchers to observe teachers' professional agency in a new way and process teachers' sustainable PD in play-based learning programs.

6.4 Conclusion

The hybrid educational experiment reported in this chapter explained how teachers promoted their PD while collaborating with researchers through a WeChat conversation and onsite training, to meet government and societal demands in the play-based teaching program, cope with the conflicts and develop transformative

practices. This chapter contributes to the digital methodology and literature by investigating the characteristics of hybrid educational experiment towards teachers' professional development. It highlights that the hybrid educational experiment creates motivating conditions in supporting the collaborative work between the teachers and researchers. It expands our understanding of teachers' transformative learning process through ongoing sustainable educational experiments and extending the literature on PD limited in Chinese kindergarten teachers' self-reflection (Yang & Rao, 2020), or mainly referring to practical knowledge and less to theoretical learning (Chen, 2008; Zhang, 2012). Furthermore, the hybrid educational experiment creates the possibilities for the ongoing collaboration between teachers and researchers for the sustainable change in PD. The timely communication through hybrid mode ensures the PD training is appreciated by teachers. This chapter presented the snapshots illustrating the power of the hybrid educational experiment as a research methodology to enhance teachers' confidence and competence in developing play-based learning programs and ensure the quality and validity of the research as it enhances researchers' meta-awareness of teachers' meaningful PD.

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Part II

Digital Analysis

Chapter 7

Dialectical Pathways in Digital Data Analysis



Glykeria Fragkiadaki , Marilyn Fleer , Elin Eriksen Ødegaard ,
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Abstract In recent times of crisis, contradictions, and drama researchers stood in front of a labyrinth of multiple methodological choices and imponderable research paths and directions. In many cases, this new reality created the opportunity for the researchers to think in novel and innovative ways by involving in a critical, dialectical, and open-ended “dialogue” with their data and the analytical processes. Part II brings together four indicative examples of research labyrinths and the new methodological frameworks the researchers invented to step their way out of them. It is argued that dialectics and dialectical thinking opened new spaces for reflection and allowed new dimensions of digital analysis to emerge. Through the Chapters of the Section, it is shown how researchers developed their creative imagination by focusing on new units of analysis and uses of digital means, how they strengthened their methodological agency by inventing new methods, and how they developed their personalities as researchers through new motives and values. This complex and unique in each case process is discussed in this Chapter as a socially and culturally oriented process in motion.

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7.1 Introduction

The crisis can be examined as a multidirectional labyrinth, a complex branching puzzle with multiple choices of paths and directions. Labyrinth is not only the place where we get lost but mainly the journey to discover ourselves and become aware of the complexity of the world and its various potentialities. By developing creative, mediating activity, people explore the labyrinth and invent cultural means that allow them to get out of it (Dafermos, 2022, p. 9).

The pandemic and the various and diverse crises the pandemic generated and/or brought to the surface changed the trajectories of several research projects and, in many cases, the routines of our research lives in academia. Interrupted communications with participants in the studies, limitations of time and space in the field, new forms of presence and physicality of participation affected the type, the amount, and, in some cases, the qualities of empirical data collected and generated in the research field. Correspondingly, this new reality changed the scene and posed new demands in data analysis. The contradiction between the initial aim of a study and the reality of research in times of crisis led to tensions and the drama of the reformation or reorientation of the data analysis processes. Researchers stood in front of a labyrinth of multiple methodological choices and imponderable research paths and directions. However, as Dafermos (2022, p. 10) argues “during ongoing and unprecedented global crises, it is essential to think, imagine, learn and develop out of the box.”. In many cases, this tantalizing new reality created the opportunity for the researchers to get involved in a critical, dialectical, and open-ended “dialogue” with their data. It made them reflect more on their data sets, think differently about their analysis, use different lenses or new methodological standpoints to see potential in data, and find new horizons in research. Part II brings together four indicative examples of research labyrinths and the new methods the researchers invented to step their way out of them. To follow the metaphor of the labyrinth, dialectics are seen here as the clew that allowed and supported this passage.

As also shown in Chap. 1, the condensed forms of development created by the global pandemic allowed researchers to stretch their theorizations, master methodological principles, empower their analytical skills, and deepen their understanding of children’s worlds. In this Chapter, we showcase how in diverse research contexts and various forms of crisis researchers, implicitly or explicitly, used dialectics to think in new ways and developed new methods to deepen their analysis. Drawing on the cultural-historical theory, we conceptualize dialectics and dialectical thinking as a creative mode of thinking (Dafermos, 2018) that allows the identification of interrelations between elements, the synthesis of these elements as a whole, and the understanding of the changing and transformative nature of this whole over time. A crisis is seen here in a twofold way. Firstly, as “a basis to exercise creativity”

(Vygotsky, 2004, p. 28–29). Secondly, as an accelerator of the process of becoming and maturing as researchers in the same way that “crises act as accelerators of the ‘whole process of history’ “(Dafermos, 2022, p. 7). We also argue that the digitalization of the data and data analysis procedures created the conditions for this dialectical shift in times of crisis.

Within this framework, we introduce the idea of researchers’ *creative imagination* conceptualized as the perspicacity and the insightfulness that allows the researcher to start seeing data in a deep relational rather than causal way. The crisis as a *turning point* in the process of development of many researchers that allowed them to unpack and develop their *researchers’ personalities* is also discussed. Together with the notion of the *researchers’ consciousness* as a mature form of researching together with teachers discussed in Part I, the findings build on our understanding of the emergence of a form of *digital methodological agency* for researchers. The unique way this agency was developed and expressed in each case as a response to the new societal conditions and the new institutional realities that followed is presented in the following sub-section.

7.2 New Methods of Analysis in Times of Crisis

Part II of this book illustrates and brings together four Chapters. Through the four Chapters the challenges and opportunities of digital analysis that emerged while researching within early childhood institutional and home settings in times of pandemic and in times of crisis are illustrated. The Chapters are written collectively by Ph.D. students, early and mid-career researchers, and experienced researchers. All researchers are devoted to researching with young children in ethical, responsive, responsible, and innovative ways to understand and better support the child’s worlds.

In Chap. 8, Gillian O’Connor, Glykeria Fragkiadaki, Marilyn Fleer, and Prabhat Rai share insights about *The use of digital artifacts to analyse science concept formation in very young children*. The chapter introduces the reader to the uniqueness of science learning and development in infancy and toddlerhood. The authors foreground the strengths of young learners in science and the complexity of their science experiences. At the same time, the contradictions, tensions, and dilemmas when researching with very young children are spotted and highlighted (e.g., mapping their thinking in science while they are non-verbal yet, or making visible what has remained unknown that is, the capacity of infants in science). The above challenges are framed in the pandemic and post-pandemic era. The chapter points out how the uncertainty of the pandemic put more and different demands on the existing challenges as well as the role of the researcher within this highly demanding and continuously changing framework. The authors suggest how using a digital visual methodology and adopting a dialectical research lens, many of the challenges inherent in studying very young children, and research limitations imposed by the pandemic can be overcome. Digitalization allowed the researcher to revisit the empirical

data sets and search for the infants' science experiences in dialectical interrelation with reality and the relations created in the activity setting. It is argued that digital artifacts can create the conditions for the digital recreation of the body and the experience of the child providing access to a revised and enriched research reality that the researcher is able to revisit and reflect on from different perspectives. The creative imagination of a researcher in times of crisis and in digitalized situations appears to be critical for unpacking and better understanding the multiple and diverse aspects of the young child's learning and development.

Chapter 9 entitled *A cultural-historical re-conceptualisation of digital pre-and post-survey design embedded in a dynamic multi-modal professional development program* is written by Anne Suryani, Marilyn Fleer, and Prabhat Rai. The chapter touches upon the critical issue of the professional development of early childhood teachers. The concept of crisis appears in the chapter in a twofold way. Firstly, as a developmental crisis expressed by early childhood teachers as a response to the continuous demand and need to improve their knowledge, skills, and competencies in order to respond to a highly demanding profession. Secondly, as a crisis experienced by early childhood teaching through the implementation of a CPW as a teaching intervention in early childhood settings everyday practice. The chapter provides a novel analysis of empirical data coming from mixed methods and multiple sources. From a cultural-historical perspective, the analysis goes beyond documenting the outcomes of the professional development of the participants in the program. A cultural-historical re-conceptualisation of pre- and post-survey design is introduced. How points of crisis, were embedded in early childhood teachers' new educational realities and led to qualitative changes in their practice are presented and discussed. The chapter adds to the literature providing insights into a cultural-historical understanding of teachers' development.

Maria Dardanou, Ioanna Palaiologou, and Sarika Kewalramani contributed to the book by Chap. 10 which is entitled *Cultural Historical digital methodologies and analysis: Lessons learned from a hybrid to a fully digitalised approach*. The chapter explores children's use of Internet of Toys (IoToys) at home with make-believe play and the types of interactions/behaviours within children's make-believe play in digital playscapes. The study is part of a small-scale research project in England, Norway, and Australia. As in most cases presented in this book, the new demands posed by the pandemic led to the reformation of the study design and the data collection process. To respond and adjust to the new reality, the researchers made the choice to use remote data collection methods and narrative observations. As a result, a wide and diverse range of digital data was generated such as self-recorded videos by parents at home settings, multimedia messages including pictures, videos, short written reflections from parents of children's play at home through a private WhatsApp group, data from children's live zoom-based play combined with conversations with the researcher, and self-recorded videos by early childhood teachers. A plethora of modes such as speech, sound, text, digital touch, and movement were digitally captured and recorded within children's physical and digital play spaces. To consider the challenge of multiple modes the authors

introduced and used a multimodal analytical approach. Thematic analysis, inductive and deductive approaches, semantic and latent approaches were dialectically combined and used as an analytical scheme to explore children's play. These multiple modes appear to capture the wholeness of the context allowing the researchers to put together and make sense of different types and qualities of data and deepen their analysis. The chapter concludes with a critical reflection on visual research methodologies where the authors discuss a framework to respond to ethical anxieties and dilemmas in context.

Written by Fatema Taj Johora, Marilyn Fleer, and Marie Hammer Chap. 11 is entitled "*Digital methodology beyond the everyday: Analytical model for interpreting inclusion of children with disabilities in preschool*". The chapter seeks to capture inclusion in action within preschool settings. Using digital methodologies the research design focused on five principles to utilize the quality of the collected data and allow an in-depth analysis: (a) going beyond the technical capture of the data collection process had been informed by theory, (b) capturing the whole experience rather than a fraction of the experience of the child, (c) generating data within the everyday educational reality that is, into a living laboratory rather than to collect data in clinical settings, (e) collecting digital data over time to capture development as a dynamic process, and (f) theorizing participation by a cultural-historical conception of child development and explain it as a social relation. The chapter illustrates the dialectical interplay between the child and the institutional practices. It is shown that this interplay can lead either to a crisis or an opportunity for inclusion and development depending on the responsive and supportive or not role of the adult. In line with the previous empirical insights gained by Chaps. 8, 9, and 10, it is the essence of the dialectics and dialectical understanding between the child and her environment that allowed the researchers to conceptualize inclusion beyond the traditional biomedical model or social model and understand the child's needs and intentions.

In the following Figure (Fig. 7.1) the foreseeable (FC) and the emerging within the pandemic crises (PC) for each research project presented in Chaps. 8, 9, 10, and 11 are presented. The new methods of analysis that were generated in each case as a response to the demands of the new research realities are illustrated. We have chosen this figure to illustrate both the foreseeable along with the pandemic crisis. Our goal is to showcase that the pandemic crisis did not exist in an autonomous context. It came as an adding and unexpected challenge in the already complex and demanding research reality of a study. Thus, we suggest that the two types of crises, the ordinary and the main pandemic crisis, should be considered holistically.

Through the four cases presented above we can see how the crisis, expressed through and as contradictions, drama, tensions, and dilemmas, posed new demands on the researchers and how new and advanced methods of analysis in digital contexts were developed as a response to these new demands. In the sub-section that follows, we theorize these new methods as social and cultural practices, and we seek to explore the genesis of these practices and the essence of these methodological innovations.

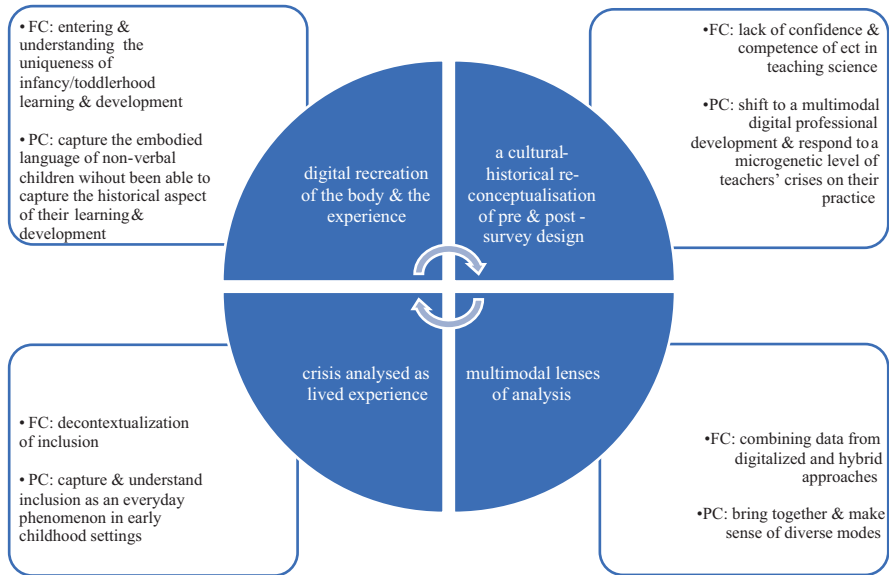


Fig. 7.1 New methods of analysis as a response to foreseeable and emerging crises

7.3 Dialectics: A Clew in the Research Labyrinths

Vygotsky’s treatment of crisis is based on the dialectical relationship between continuity and discontinuity, qualitative and quantitative changes. The connection between opposite sides and forces of the developmental process is intrinsically dynamic and dialectical rather than static and metaphysical. (Dafermos, 2022, p.7)

In all cases presented above, the crisis became evident in the research projects in different ways such as contradictions, drama, tensions, and dilemmas. However, despite the disruptions, the destabilizations, and the transformations, in none of these cases, did the crisis become an obstacle or a disorientation in the process of development for the researcher or the research project. Researchers appeared to experience the crisis as a turning point and managed to meet the new demands posed by the global pandemic and the ongoing challenges. But, it is only when researchers started looking for the dialectical relationships within the data sets, recognizing new units of analysis, and synthesising the interrelations in a new whole that became able to see beyond and through the crisis, underpin new methods, and create new developmental conditions for their research projects and, importantly, for the participants in the projects. It is argued that dialectics became the turning point in researchers’ experience and thinking and led to the development through the crisis.

For example, in Chap. 8 we watch the discontinuity in capturing and documenting the historicity of infants’ and toddlers’ learning and development as well as the contradiction of trying to capture development while children were non-verbal, and no narratives were recorded in the data sets. Using a dialect lens allowed researchers

to focus, analyze, and reflect on the unity between intellect and action (Vygotsky, 1987) as well as the dialectic relation between the biological aspect and the social-cultural aspect of learning. Children's conceptual thinking in science and the embodiment of their science experience expressed by aspects such as gestures and body positioning, are seen as a whole. This holistic understanding gave us an insight into young children's thinking in science and allowed us to see evidence of learning and qualitative changes in the child's development in science at a microgenetic level.

Chapter 9 shares insights into the dramatic situation of teachers trying to sustain and develop their practice in a demanding field such as STEM learning in times of crisis. The core contradiction, in this case, lies in trying to achieve professional development in a shut-off world and a profession that is multiply besieged. Apart from these opposite situations, the researchers appeared, in this case too, to face discontinuities in the data collection processes as well as the demand to bring together and make sense of qualitative and quantitative changes in teachers' professional development process. Following a cultural-historical perspective, the researchers used a dialectical lens to reflect on their data and bring them together in a meaningful system. Dialectical thinking is seen here in two ways. Firstly, through interrelating the teacher and the professional community, that is, showing the unity between the individual and the collective. Secondly, through interrelating and seeing as whole quantitative and qualitative changes in the professional development process of teachers combining data from online surveys, workshops experiences, and practice in the classrooms.

Respectively, in Chap. 10, a discontinuity of empirical data is also described. In parallel, issues about contradictions in using visual methodologies and dilemmas regarding ethics are discussed. The authors used a dialectical lens to find the connections between chunks of data in diverse contexts and situations. It is through the unity of modes though that the researchers begin to make sense of the data and understand children's development. In this research example, dialectical thinking allowed researchers to unpack the cultural nature of digital artifacts and visual methodologies to capture the lived experiences of children. However, as the authors argued the role of the researcher and the researcher's agency and personality is critical. Researchers should continuously be in a dialectical interrelation with the data sets in order to seek signs, schemes, symbols, and ethical "micro-moments" that will allow us to make sense of the child's complex worlds in times and contexts of crisis.

In Chap. 11 dialectics are expressed through the unity of the child and the social reality experienced in early childhood settings. Central to this chapter is the dilemma of how to capture and understand inclusion in a way that reflects the child's world in everyday life. The realization of this unit allows the researchers to make an in-depth analysis of the child's inclusion as a real-life phenomenon for the child and as an everyday practice within the early childhood center. By introducing a relational model of analysis, the authors of the chapter bring together in a dialectical way digital methodology and cultural-historical analytical tools to develop new understandings about inclusion in early childhood settings.

Taken together, the above examples are indicative of how the walls of a research labyrinth might look in times of crisis. Dialectics as a cultural means changed the researchers' experience and allowed them to reform and develop their research practice to reach their research goals similar to a cathartic process. Dialectical thinking allowed new dimensions of analysis to emerge such as new units of analysis (e.g., the unity between the teacher and the professional community or between the qualitative and quantitative changes in professional development), and new uses of digital means to support the analysis (e.g., documentation of multiple modes). These dimensions are expressions of the development of the researchers' creative imagination. New methods of analysis per se (e.g., digital recreation of the body and the experience) started to develop in this framework. A new space of reflection was created where researchers managed to develop new motives such as the motive of adjustment and new values such as solidarity and resilience within research contexts were also developed. The following figure (Fig. 7.2) illustrates the stepping stones within the labyrinth that acted as the clew that allowed the passage through the crisis.

From the researcher's perspective, the above examples are seen as a journey to discover the researcher's personality and become aware of the complexity and uncertainty of the research world and its ever-changing possibilities and opportunities. Developing their creative imagination through new methods, researchers explored and mastered their labyrinths. They started building or strengthening their methodological agency by inventing new methods, and created the conditions for the development of their personality as a researcher (Vygotsky, 1998). The whole process had been a socially and culturally oriented process in motion.

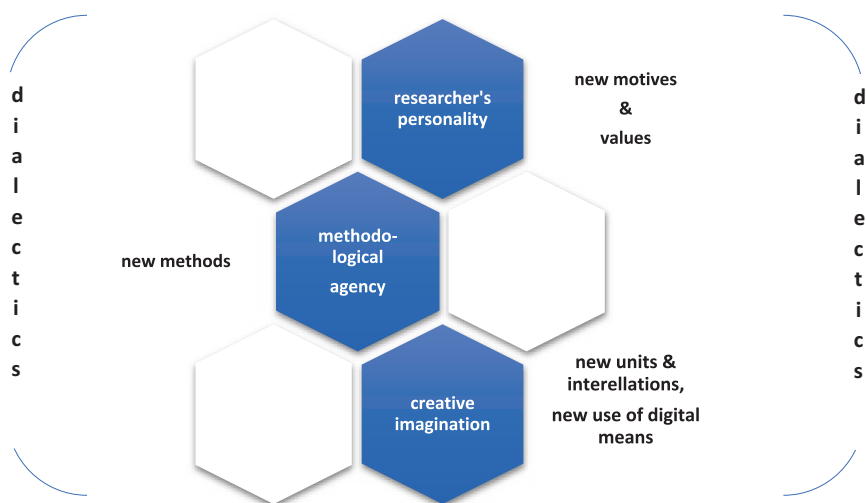


Fig. 7.2 The research labyrinth and the clew in times of crisis

7.4 Conclusions

What can be understood in the above cases is that although all research teams were experiencing a complex, challenging, and high-demanding situation they managed to rise to the occasion and successfully respond to the new challenges generated by diverse crises. In all cases, researchers appeared to go beyond the borderline of the research restrictions and the data reductions and find their pathways within the Labyrinths of the analysis. It seems that they all chose to dialectically reflect and think in ways on the analysis, making a liberating focus on understanding dialectics within the data that allowed them to see the richness and complexity of the findings. However, what is important here is that although all research teams were experiencing the same societal reality, that is the pandemic, they made sense and responded differently to the new reality. Thus, it can be argued that it was the researcher's *perezhivanie* that allowed them to experience crisis as 'a source of strength' (Vygotsky, 1993, p.56) rather than as an obstacle and obstruction.

Having this positioning in research, the researchers used their creative imagination to bring together the chunks of data they collected under extraordinary circumstances and use dialectics to see units of analysis through new methods that pay attention to the new and deep relations that come into life through and within crises. The digitalization of the data analysis procedures created the conditions for this dialectical shift allowing the dynamic and multi-perspective visit of digital data. In conclusion, the transformative nature of the crisis enhanced and empowered their analytical skills and generated the new analytical methods presented in detail in the chapters that follow in this Section.

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Chapter 8

The Use of Digital Artifacts to Analyse Science Concept Formation in Very Young Children



Gillian O'Connor , Glykeria Fragkiadaki , Marilyn Fleer ,
and Prabhat Rai 

Abstract Research examining conceptual development in pre-school age children has relied predominantly on children's verbal responses and interactions. During infancy, however, immature verbal language skills limit the use of such commonly used methods. Studying infants and toddlers during the pandemic has added new challenges to this unique and highly demanding research area. In this chapter, we showcase how digital visual methods, developed and introduced in response to this methodological 'crisis', offer researchers a means through which many of the challenges inherent in studying very young children, can be overcome. To highlight the affordances of using digital artefacts to analyse very young children's concept formation, the chapter focuses on science concept formation, during infancy and toddlerhood. Indicative examples from the implementation of a Conceptual PlayWorld as an educational experiment (see Chap. 2) offer illustrative examples of digital data analysis with children aged 8 to 36 months. It is shown that using digital artefacts, subtleties of development reflected in physical movement and interactions (e.g., gestures, embodied peer interactions), can be captured and later analysed. Key points researchers using digital artefacts, are able to look for, capture, and dialectically interrelate when analysing concept formation in very young children specifically are highlighted. We argue that digital artifacts allow the digital recreation of the body shading light to new dimensions of the child's experience in science and opening a space for reflection for researchers. Consequently, adopting a dialectical lens in analyzing digital data, possible insight into the process of concept formation as it occurs for very young, non-verbal children, is afforded.

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8.1 Introduction

Early science learning experiences are essential for the development of children's scientific knowledge and inquiry skills. Empirical research on science concept formation in the early years has, however, focused primarily on children aged three to six. Our understanding of science learning as it occurs for children from birth to three, therefore, is extremely limited. With older pre-school age children (3–6 years), it is well understood what the researcher is 'looking for' when seeking to explore conceptual development within an everyday educational context and how to capture it. Our previous research (O'Connor et al., 2021) has brought together diverse research techniques for documenting the process of early science concept formation such as pre and post-tests, semi-structured interviews, children's dialogues, and/or children's drawings. In these examples, children's learning was mainly expressed through children's scientific narratives and artefacts. With very young non-verbal children, however, much less is known about what the indicators of learning in science are and how to capture science concept formation. Restrictions in research in times of crisis made this fundamental challenge of researching with very young children far more complex as researchers had no access to supplementary sources such as historical documentation of infants learning as they turn toddlers and then pre-schoolers or to extended recordings from educational reality in early childhood settings, and follow up meeting with early childhood teachers. In this framework, researchers faced a need to seek for deeper interrelations and think differently about the digital data available to them.

In this chapter, we showcase how adopting a digital visual methodology, many of the challenges inherent in studying very young children, and research limitations imposed by the pandemic can be overcome. Using digital artefacts, subtleties of conceptual development such as those expressed physically through gestures and embodied peer interactions can be captured and later analysed. We argue that digital artifacts can create the conditions for the digital recreation of the body and experience allowing access to multiple and diverse aspects of the child's learning and development and deepening the researcher's understanding of the digital data sets. Thus, insight into concept formation as it occurs for very young children within the context of their everyday educational reality, is afforded.

The chapter uses case examples from a cultural-historical study, to highlight the possibilities digital artefacts offer for analysing science concept formation in very young children. A brief overview of the study from which the case examples are taken, is firstly provided. Subtleties of development the researcher analysing very young children's concept formation using digital artefacts, is able to 'look for', are then presented (see Table 8.1). Using an illustrative example, components of a digital visual methodology of specific significance when working with very young

Table 8.1 Subtleties of development through digitally analysing concept formation in very young children

Observations in digital data		Illustrative examples
Embodiment	(a) Gestures (b) Embodied actions (c) Symbolic representations (d) Repetitions (e) Facial expression (f) Direction & duration of eye gaze	e.g., A child pretending to be a butterfly moves her arms up and down to represent a butterfly ‘flapping its wings’ e.g., A child attempts to imitate the hand movements (gestures) made by an educator as they sing a nursery rhyme e.g., The direction and duration of an infant’s eye gaze during an interaction with a peer/ educator when approaching a concept
Preverbal communications	(a) Babbling (b) Sounds making (c) Nonverbal interactions with peers/ educators	e.g., An infant watch an older peer repeatedly say the word ‘apple’ (in response to a question raised by a nearby educator). The infant is then themselves, attempts to say the word ‘apple’
Physical positioning	(a) Spatial distance or proximity (b) Physical interactions with peers and/or educators	e.g., The spatial distance of an infant to peers and/or educators, within an activity setting.

children, is then discussed. Concluding sections discuss how, from a cultural-historical perspective, a digital visual methodology affords insight into very young children’s concept formation within the context of the everyday educational reality.

8.2 The Digital Recreation of the Body and the Experience of the Child

The data presented in this chapter were generated as part of a study conducted at an early years education center in Melbourne, Australia. The study sought to explore the process of science concept formation during infancy and toddlerhood. Thirty-two children, aged 8–14 months, and eight educators participated in the study. The study used a cultural-historical framework to design and implement a Conceptual PlayWorld as an educational experiment (see Chap. 2). The Conceptual PlayWorld is a model of intentional teaching that supports STEM learning through play, (Fleer, 2018). As an educational experiment, researchers worked with early childhood teachers to plan and implement two Conceptual PlayWorld’s which focused on developing children’s understanding of biological science concepts.

Adopting a digital visual methodology, each Conceptual PlayWorld was digitally recorded using 3 video cameras (1 static, 2 hand-helds). Digital data was then analysed using a 3 layered interpretative process (Hedegaard, 2008). To help understand the process through which the children were developing understandings of the

science concepts, the digital data was analysed using cultural-historical theoretical concepts as the interrelation between everyday and scientific concept formation, ideal and real form, and motives and demands.

Using digital artefacts within the context of a digital study design, researchers were able to capture and later analyse, subtleties of development reflected in the children's physical movements and interactions such as the child's physical positioning in relation to peers, the direction and duration of an infant's eye gaze. Through analysing these subtleties of development available in the digital data, researchers were able to gain insight into the process of science concept formation as it was occurring for the children within the context of the Conceptual PlayWorld. An overview of the subtleties of development researchers using digital artifacts were able to look for, when seeking to analyse the conceptual development of the children in the study, is presented in the following table (Table 8.1).

Table 8.1 provides an overview of the subtleties of development researchers, using digital artifacts, are able to look for, when seeking to analyse concept formation in very young children. Three main categories were created to cluster our observations in digital data sets: (a) embodiment, (b) preverbal communications, and (c) physical positioning. As shown elsewhere (Fragkiadaki et al., 2022, 2023), these elements can be understood as an indication that the child is forming a concept. For example, an embodied action can be representative of a child's exploration of a concept. At the same time, analysing these elements as a whole can give an insight into how the child is forming a conceptual understanding. For example, through preverbal interaction with peers such as making the sound of an animal together, children may experience a deepening in their conceptual understanding. Respectively, the direction and duration of an infant's eye gaze can tell us what and/or to who the infant is paying attention to. How a child enters into and exits from an activity setting, can also be determined through observing their physical positioning in relation to peers and/or educators. To illustrate how the analysis of the subtleties of development (presented in Table 8.1), can contribute to an understanding of the process of conceptual development in very young children, an example of analysis, based on children's 'physical positioning' is now presented (Vignette 1). How this, in turn, contributed to an understanding of the process of conceptual development, is then discussed.

Vignette 1 A group of children sits on a mat whilst an educator reads the book, 'The Very Hungry Caterpillar' by Eric Carle. After finishing the book, the children are encouraged to leave the mat area and line up in front of a second educator, where they are given a headband to signal their entering into the imaginary play space as a caterpillar (Fig. 8.1). Two children from the group do not line up with their peers to receive a caterpillar headband (Fig. 8.2). They instead remain on the mat area watching their peers and the two educators. Figure 8.1, was captured by Camera A and Fig. 8.2 was captured at the exact same time from a different angle by Camera B.

Cultural-historical theory conceptualises development as something that must be understood and examined as a holistic and dynamic process (Fleer & Ridgeway, 2014). In the case example presented (Vignette 1), using multiple digital artefacts

provided researchers with a means through which the research context, in addition to the child's activity, could be considered. To capture holistically the activity occurring within the Conceptual PlayWorld, 3 digital video cameras were used (1 fixed camera and 2 handhelds). Using three cameras in this manner, the dynamics of the educators' and children's participation within the Conceptual PlayWorld in relation to the science concept could be captured. For example, the physical positioning of two children (Fig. 8.2) differs from that of their peers (Fig. 8.1) within the context of the activity setting. This difference, when later interpreted in relation to other contextual aspects of the activity setting, provided the foundation for deeper analysis and subsequent theorisation. Consequently, having data from multiple cameras, factors contributing to the children's differing social situations of development were captured which supported the later interpretation and analysis of data.

Vignette 1 demonstrates how the digital recreation of the child's experience in science can contribute to and deepen the analysis. Combining and interrelating evidence captured at the same time but from different angles and perspectives, the researcher can observe and understand the child's experience as a multi-dimensional and multi-level experience. For example, the researcher can map dialectical interrelations between the child's positioning in the space of the classroom, the child's engagement with the science experience, and the development of the child's conceptual understanding. At the same time, the child's personal pathway within the activity setting can be dialectically interrelated to her peer's pathway and/ or the pedagogical choices and positioning of the early childhood teacher. The following figure (Fig. 8.3) captures the process of the transition from the empirical evidence



Fig. 8.1 Children line up to receive a 'caterpillar' headband from Educator 2



Fig. 8.2 Two children remain on the mat area watching their peers line up

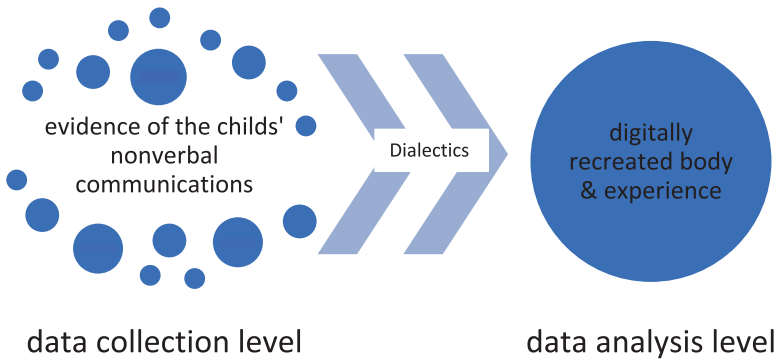


Fig. 8.3 The process of a digital recreation of the child's body and experience

of the child's nonverbal communications to the digital recreation of the body and the experience that allows a relational understanding of the child's conceptual development in science. In the figure, the first icon captures the messy nature of the data collection process, whilst the second icon symbolises how during the analysis the researcher becomes more systematic and ordered in how they come to understand the data. But as this is an iterative process, we bring forward in the figure the dialectical nature of analysis. For instance, in the figure, the child's gestures and positioning in space could be represented as evidence of the child's nonverbal communication within the activity setting. When these pieces of evidence are dialectically interrelated to the early childhood teacher's scientific narrative and the child's engagement with the concept throughout the activity setting they allow us to understand the

critical role of gestures and positioning as part of the child's learning in science. Using a dialectic lens the researcher becomes able to interrelate and, importantly, synthesize diverse and multiple evidence from the data set that is complementing as well as to follow these interrelations as they change and transform over time. Following dialectical thinking the evidence is creatively combined as a whole providing access to a revised and enriched research reality that the researcher is able to revisit and reflect on from different perspectives (see also Chap. 7).

Rather than being a barrier to understanding the child's conceptual understandings, digitalization overcomes the here-and-now limitations and transforms the norm of commonly used methods for mapping conceptual development. Digital observations allow the richness of the infants' and toddlers' dynamic communication means to be captured and the complexity of the science experience to be better unpacked. What is important to note here is that the digital recreation of the body and the experience is different from the digital representation of the experience or the mainstream understanding of the digital body as an avatar of the personality (Davis et al., 2009). The digital recreation of the body brings us closer to the child's personality rather than taking us away from it in the way the digital body may do.

8.3 Conclusions

The aim of the cultural-historical study from which the case example presented was taken, was to examine possible ways through which very young children develop science concepts within the context of an imaginary play situation. In older preschool-aged children (3–6 years), conceptual development has been examined predominantly, using methods reliant on a child's verbal responses (see for example Fragkiadaki et al. (2019) and Frejd (2021)). Using this method in the study presented was not an available option as at the age of 8–36 months, the children's verbal language skills were very limited. In addition, the limitations in research posed by the pandemic lead to limited supplementary resources and interaction to the documentation of the child's conceptual understanding as a historical process that develops over time. In response to these methodological challenges, researchers used digital artefacts within a digital study design firstly to capture diverse aspects of the child's experience and then, to combine these aspects and interpreted them as a whole recreating the science experience of the child and how the child was positioned within this experience.

Adopting a cultural-historical perspective, researchers, used digital methods not to explore children's developing conceptual understandings through 'questioning', but instead, digital methods were used to examine the dynamic interactions and communications occurring between children and educators as they participated in the Conceptual PlayWorld. Using digital artefacts, researchers were able to capture and later analyse, subtleties of development reflected in children's overall science experience. Through analysing these subtleties of development available in the digital data, researchers were able to digitally reconstruct the child's embodied science

experience and gain insight into the process of science concept formation as it was occurring for the children within the context of the Conceptual PlayWorld.

In conclusion, from a cultural-historical standpoint, the chapter suggests a dialectic reading of what is digitally recorded and documented as a means to deepen the analysis. It has highlighted how, through applying the dynamic interpretive process of analysis, whereby digital data is revisited, in conjunction with having digital data from differing perspectives of the same moment (multiple cameras), theoretical insights into the process of concept formation for very young children can be gained. The chapter contributes to a better understanding of the affordances cultural-historical digital visual methods can offer, to researchers seeking to examine the everyday lived experiences of very young children within the context of the educational setting. Contributing to a much-needed methodological 'path' (White, 2009) better insight into the lived moments of infants in early childhood educational settings can be gained and educational provision to our youngest learners enhanced.

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Chapter 9

A Cultural-Historical Re-conceptualisation of Digital Pre- and Post-survey Design Embedded in a Dynamic Multi-modal Professional Development Program



Anne Suryani , Marilyn Fleer , and Prabhat Rai 

Abstract The dynamic nature of an early childhood education workplace is a challenging one that continuously seeks to test educators*, and therefore it is common for them to consistently seek to improve their knowledge, skills, and competencies. Amongst the myriad of different professional development strategies that exist to help early childhood educators with their professional development, how might we capture teacher development? How do we authentically capture this dynamic context and make visible how teacher practices change and teachers themselves develop? One tradition has been to undertake pre- and post-surveys. Yet this method does not in itself bring out what Vygotsky (*The collected works of L. S. Vygotsky* (Vol. 5. Child psychology) (Rieber, R. W. (Ed.)). Plenum Press, 1998) theorised as the idea of a developmental ‘crisis’. Further, teacher development was never the focus of Vygotsky’s theory of human development. This chapter provides insights into how this can be achieved through a cultural-historical re-conceptualisation of pre- and post-survey design which includes a series of data collection points over time within and across dynamic practices of a professional development program that was simultaneously challenging and motivating for teachers.

Keywords Professional development · Early childhood educators · Mixed methods approach · Crisis

*In this chapter, the authors use the terms ‘educators’ and ‘teachers’ interchangeably.

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9.1 Introduction

Vygotsky's (1998) writings on the concept of crisis especially in his work on the "Problem of age" highlight that children enter new institutional practices in each developmental period (early childhood, preschool, and school-age). In this chapter, we are drawing on this core argument that new institutional demands are central to the experience of crisis. Another related argument is that a crisis leads to a revolutionary path of development (i.e. transformation or qualitative change) in the existing practice. In our Monash University PlayLab research, while working with teachers on their professional development to support teacher engagement in STEM concepts using a play pedagogy, we intend to highlight similar arguments. Our professional development program of Conceptual PlayWorlds for STEM is guided by two broad intentions—one to generate evidence about teacher's professional development and second to enhance teacher's capacity to contribute to children's STEM concept learning in early years.

The current landscape of early childhood education has traditionally been challenged by bringing STEM knowledge and skills competencies into play practice. In-service education is crucial to maintaining a high-quality early childhood workforce and retaining it by offering options for skill upgrading and career progression (OECD, 2022). It is imperative to continue building early childhood educators' knowledge and skills through continuing professional development that matches their needs (OECD, 2022).

A professional development program is often recommended as a primary method of enhancing the quality of early childhood education (e.g. Jensen et al., 2017; Schachter, 2015). It is regarded as an essential quality improvement initiative that can greatly aid in supporting young children's development within today's mixed delivery early education system (Build Initiative, 2019; Weiland, 2018). In many countries including Australia, there have been efforts from the government to improve the quality of early childhood educators' practices by providing funding for professional learning (Productivity Commission, 2011, 2014; Waniganayake et al., 2012). However, there is an absence of systematic assessment of the quality of the respective education organisations, as well as the professional development programs delivered (Hadley et al., 2015). Measuring the impact of these professional development programs can be further complicated by the diverse educational background of the early childhood workforce varying from certificate, and diploma-to degree-qualified graduates, with each educational level emphasising different skills and knowledge (Suryani & Flear, 2024).

This chapter offers an important alternative study design on how we can capture and make teacher development visible in terms of how professional development can create both motivating and crisis conditions that influence meaningful changes in early childhood educators' practices.

To achieve this goal, we will start by explaining how professional development conceptualised from a cultural-historical perspective gives challenges in designing research where pre- and post-survey designs are traditionally featured. We explore

how there is a theoretical contradiction between traditional measurement studies and qualitative impact study designs. This is followed by a discussion on how we seek to solve the research contradiction that presents itself within a new context of a global pandemic. We showcase examples of pre- and post-survey design questions and our multimodal digital professional development program that was developed because of the global pandemic. We will then use the example of a Conceptual Playworld as a planned intervention as the content of the methods we re-conceptualise using cultural-historical theory.

9.1.1 PD Programs for Early Childhood Educators

Studies on early childhood professional development should go beyond basic questions that address individual characteristics of the educators (e.g. prior qualifications, length of relevant experience) and their associations with attributes of knowledge, skill, or practice. Several aspects need to be considered when investigating the impact of early childhood professional development programs—not merely about the technical aspects (i.e. methods, formats, deliveries) but also its processes and outcomes (i.e. the impact on the educators themselves, parents and families).

This is crucial because according to Vygotsky's (1998) idea of developmental 'crisis', educators who are aware of their practices through experiencing challenges and professional tensions in their work environments may feel compelled to take part in professional development programs as they feel the demand to improve their knowledge and skills. Therefore, rather than simply observing the impact of a one-off professional development activity, it is more important to know why and how educators implement in their daily practices the activity they learnt from professional development program over a long-term scale.

9.1.2 Types of PD Format and Delivery

There are at least four types of professional development. First, it can be a *specialised training* that provides specific skills (e.g. Maxwell, 2006; Tout et al., 2006) and are often one-way with limited follow-up or feedback on observed practice (Pianta, 2006). Second, it can be in a format of *coaching* which may involve independent and/or shared observations, action (demonstration, guided practice), self-reflection, feedback, and evaluation. It often requires frequent interactions over a relatively short period of time (Hanft et al., 2004). *Consultation* is another type of professional development where the facilitator often focuses on solving problems and providing professional support for an immediate concern or goal requested by the educators (e.g. Sheridan & Kratochwill, 2008). Finally, a type of professional development that is well known is *community of practice*. This involves a group of individuals with common professional interests who have a desire to improve their

practice in a particular area by sharing their knowledge, insights, and observations (e.g. Wenger, 1998; Wenger et al., 2002). Members of the group may ask questions, connect and build ideas, expand key points, share resources and success stories that emerge from authentic situations and personal experiences. Out of these aforementioned types of professional development, which is considered the best is often subjective; it primarily depends on many factors including educators' educational backgrounds, professional needs, and work environment.

There is a consensus that professional development plays an important role in improving early childhood educators' skills, knowledge, and dispositions (e.g. Sheridan et al., 2009). However, there is limited empirical evidence on how to measure the effectiveness or the impact of teacher professional development (Schachter, 2015).

In a review of 73 studies of professional development targeted at early childhood teachers, Schachter (2015) found that more than half of the studies used some form of coaching, and more than half delivered professional development via training workshops. In measuring the professional development outcomes, 51% of the studies measured changes in teacher practice, 18% measured changes in teachers' knowledge, 40% measured changes in children's learning, and another 11% focused on measuring changes in children's behaviour. However, few of these studies drew upon a cultural-historically framed study of *teacher development*. They were mostly oriented to learning or practice change. We think a focus on development with its conceptualisation of crisis offers a valuable contribution. Specifically, Vygotsky's theory never covered teacher development, his focus was on children's development.

We are drawing on the data being collected as part of our longitudinal study over the last four years to make our methodological principles visible.

The Conceptual PlayWorld intervention formed the centrepiece of our professional development program and whilst it was designed to improve early childhood educators' confidence and competence in teaching Science, Technology, Engineering, and Mathematics (STEM) concepts, we know from our data that crisis became a central motivating force for teacher development.

9.2 A Cultural-Historically Framed Survey Approach that Was Within a Dynamic Professional Development Program

The study design consists of professional development programs along with a series of data collection points that were dynamically and culturally related. Studying something in the process of change is the basic demand of the dialectic method, which is an essential element of Vygotsky's theory. He argues against the postmortem approach to research, the central idea is to research phenomena in its development: "encompass in research the process of development of something in all its phases and changes from the moment of its appearance to its death-means to reveal

its nature, to know its essence, for only in movement does the body exhibit that it is.” (Vygotsky, 1997, p. 294). Notably,

Conceptual PlayWorld as an intervention creates a condensed and amplified experience for children and their caregivers and teachers where the object of inquiry is seen (1) in-motion; (2) beyond fossilised complete forms; (3) the past in the present, and (4) where the researcher has a central role in developing practice in collaboration with teachers (Fleer et al., 2020, p. 57).

Before the professional development, the educators are invited to complete a short online survey (i.e. data set 1) which takes about 10–15 minutes to complete. There are four sections in the survey. The first section collects demographic information which includes questions about gender, age, educational background, length of teaching experience, work setting, current role, and age group they mostly teach. The second section investigates educators’ confidence in teaching STEM. The third section examines educators’ attitudes towards STEM, for instance, their level of enjoyment, perception of usefulness, and perception of difficulties in teaching STEM concepts to young children. The fourth section explores educators’ concerns about their involvement with Conceptual PlayWorld. For example, whether they would like to learn more about characteristics, resources, and the way they can implement the Conceptual PlayWorld in their own setting. However, these data points must be conceptualised within the system of human relations and practices that form the professional development program.

First, responses from the pre-professional development survey (see Fig. 9.1) are crucial as baseline information for researchers to understand educators’ background so that the professional development content can be modified to fit with the educator’s contexts (e.g. to target specific age groups or work settings). The approach is to offer responsive support to teachers. The online survey and planning session bring to the fore teachers’ challenges while developing a play-pedagogic model for

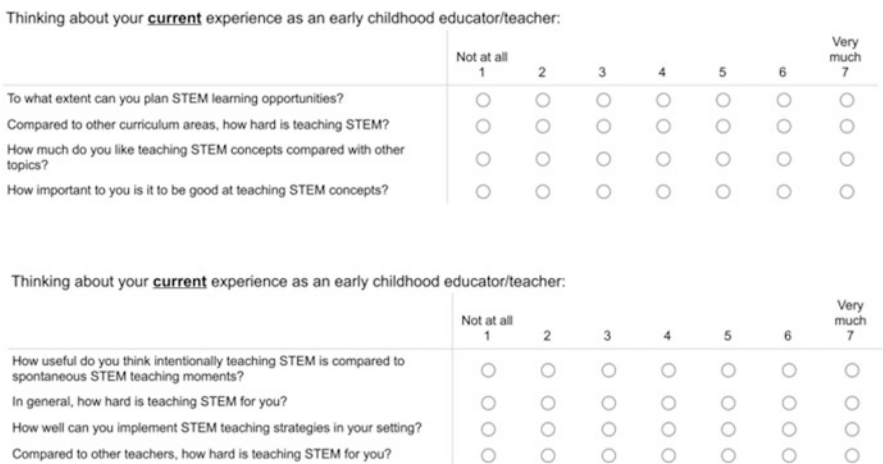


Fig. 9.1 Examples of pre- and post- professional development survey questions

their group. This is used as an opportunity to develop their emerging motive orientations for learning to develop a STEM Conceptual PlayWorld in their play-based settings. As such, the baseline cannot be conceptualised as something within the individual, but rather it is the collective dynamic of participants who bring their experiences and ways of being within the professional development program as a collective social situation of development.

From a cultural historical perspective, teachers participating in professional development programs are agentic learners who pursue and appreciate new demands, challenging themselves to connect their sense-making with the public meanings valued in teaching (Edwards, 2017). Data set 1 gave insights into how the course of data collection process and professional development made visible a shift in teachers' motive orientation and hence their intention to work with children in their play setting.

The next stage is for educators to actively participate in professional development. The professional development program is delivered as self-paced, via Zoom, and in-person. During the global pandemic, the most preferred mode of delivery was through Zoom sessions which allowed direct digital interactions between the researchers and early childhood educators. The professional development takes about two hours and consists of two parts. The first part is a presentation to guide early childhood educators through each of the five characteristics of a Conceptual PlayWorld by showing video content of what a Conceptual PlayWorld looks like in practice. The second part is a group workshop where educators plan their own Conceptual PlayWorld. This session is recorded and is analysed as part of a second data set. The data generated brings forward the struggles and the imagining of the new concepts into practice, as teachers make concrete plans for the new practice being considered.

The next phase in the study design is the practical component of the program. Participants have opportunities to implement their own Conceptual PlayWorld in their own time and setting.

Once they have experience with the Conceptual PlayWorld, they are invited to join group or individual interviews and share their reflections (i.e. third data set). The data generated from this process is oriented to how teachers make concrete the new practices as part of their everyday realities of their play-based settings. At the same time, they are invited to respond to the same questions via an online survey (fourth data set).

Second, after the completion of the post-professional development online survey, participants are invited to reflect on their experiences, identify the challenges, crises experienced, and areas for improvement. The educators are also invited to enhance their knowledge and skills through an advanced professional development program (i.e. professional development 2). These activities continue depending on the educators' needs. After the second Conceptual PlayWorld implementation, educators are encouraged to join reflection sessions where they can share their experiences and learn from each other (see Fig. 9.2).

To understand teacher development as a complex process of professional practice chance, data are gathered not just through a pre- and post-survey design as is

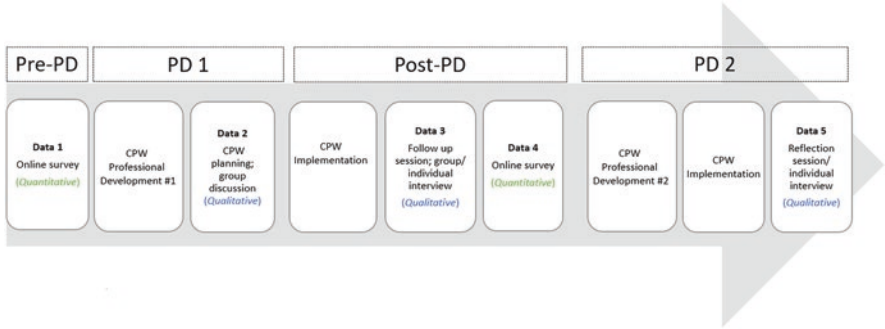


Fig. 9.2 Study design

What did you enjoy **most** in running your PlayWorld(s)?

What did you enjoy **least** in running your PlayWorld(s)?

Fig. 9.3 Making explicit how teachers meet the new demands (Question examples)

traditionally conceptualised. Rather, these surveys give context for professional development across time, where support sessions are available via a private Facebook group, email, and Zoom discussions with the researchers, whichever is convenient for participants.

9.3 How Crisis Propels Teacher Development

Conceptual PlayWorld professional development has been designed to create new motivating conditions for teacher’s development where different crisis points emerge (also see Fig. 9.3). There are three central arguments worth making here:

1. *Creating a collective professional community.* One of the central aspects of participating in the Conceptual PlayWorld professional development program is that teachers engage in an evidence-informed model of professional practice but they also feel supported by the collective. The moments of crisis thus are not individual but offer opportunities for transforming groups’ professional practice. The concept of crisis can be explained as a dramatic situation that the person lives through. This dramatic situation can be generated by contradictions that exist in a person’s environment. Contradictions cause inner as well as external tensions and conflicts that are critical for transforming and changing a person’s experience, motives and values by putting new demands on the person. During

the time of global pandemic, apart from the existing professional demands, the teachers were also navigating new responses which were expected of them to sustain their practice. The Conceptual PlayWorld professional development program gave teachers confidence and competence from an evidence-informed approach to respond to this crisis. In line with this Vygotskian perspective, experiencing a crisis is not conceptualised as an obstacle or a disorientation in the process of development. On the contrary, crisis is understood as a dynamic turning point that creates developmental conditions and becomes the source of a person's development. As Vygotsky (1998) argued, the development of the personality is not a case of stability and balance but a contradictory process and a crisis that includes transitions, destabilizations, qualitative changes and neoformations. To sustain and support these neoformations and qualitative changes, we noted how Facebook supported teachers through consistent mentoring support. The digital technology thus came to create a collective professional community through a professional development program.

2. *Creating new demands.* One of the central focuses of the Conceptual PlayWorld professional development program is to introduce new demands of professional practice for the early childhood teachers. This new demand was to follow a Conceptual Playworld approach in designing, thinking and implementing their pedagogy in their early learning centre, and this makes these teachers more aware of their existing practice. Rather than focusing on the outcome of professional development, Conceptual PlayWorlds is a process-focussed model—our intention was to study the process of teacher development as they feel challenged and negotiate new demands of weaving play and STEM concepts into their teaching practice. As Fleer et al. (2022) argues “the challenge for the teachers is how to bring into the imaginary play science concepts, so they are meaningful and enduring (rather than a one-off experiment)” (p. 11). The methods presented above gave possibilities for researchers to observe the visible signs of the crises of professional practice change (Fleer et al., 2022), at the same time giving possibilities for making visible in the analysis of the digitally documented professional development process and the responses to the surveys. Which together were valuable research tools for a microgenetic level of teachers' crises as they brought into their own practices concepts into play.
3. *A cultural-historical reading of pre- and post-survey designs.* The traditional pre- and post-design has to be conceptualised in a cultural-historical study as a tool that gives context and points in time, but is not the source of all information about teacher development. The developmental crisis may be captured through a survey, but the meaning it has for teacher development is only brought forward through the dynamics of the workshop, the implementation process, reflections, and ongoing drama that occurs in the play-based settings as the reality of the new practices morph and change in everyday practice.

9.4 Conclusion

The study design discussed in this chapter aligns well with Schachter's (2015) recommendations that researchers should draw from multiple sources to inform professional development design and implementation. For our cultural-historical study design, it was important to be innovative in professional development delivery, particularly when using digital technology to capture the points of crisis and to make safe and convenient multi-modal delivery, which involved teachers trying out new practices with support, including making reflections on self-development. Pre- and post-surveys made visible the points of crisis, but only when embedded in the realities of the new practices, where qualitative changes became understood. When the new conceptualisation of pre- and post-survey design is considered in this way, we suggest these tools and the professional development program undertaken over time, collectively capture crises points and their resolution in synthesis as teacher development.

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Chapter 10

Not Just Data: Analysing Visual Narratives of Children in Research and the Quest for “Micro-ethical” Moments



Maria Dardanou , Ioanna Palaiologou , and Sarika Kewalramani 

Abstract The chapter is based on a transnational small-scale research project in England, Norway, and Australia. The project aimed to examine how children are using IoToys at home with make-believe play and to investigate types of interactions/behaviours within their make-believe play in digital playscapes. Using digital methods for data collection based on visual methodologies principles, underpinning the synergy of cultural-historical theory and schema play concepts, we analyse digital episodes of children’s play with IoToys to demonstrate our analytical protocol. We discuss the complexities of visually capturing children’s lived experiences. Finally, we examine some of the challenges of analysing audio and visual recordings and conclude by suggesting that visual methodologies offer potentialities for rich data that capture the lived experiences of children but require to be approached as a cultural tool where the researchers should seek for signs, schemes, symbols and ethical “micro-moments”.

Keywords Internet of toys (IoToys) · Digital methods · Visual methodologies · Ethical “micro-moments”

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10.1 Introduction

This chapter is based on a research project on the integration of Internet of Toys (IoToys) at home and in early childhood education (ECE) settings in three countries: England, Norway, and Australia. Aspects of the findings of this research have been reported previously in Kewalramani et al. (2020a, b, 2021a, b, c, 2023), Palaiologou et al. (2021).

The research employed qualitative methodology and focused mainly on visual methods, as will be explained below. The chapter has four sections. The first section explains the context of the research and the methods. The second discusses our theoretical conceptualisation and explains the synergy between sociocultural theory, cognition, and social ecology. The third section explains how we analysed our visual data. Finally, this chapter reflects upon the visual methodologies we used to discuss the benefits of using such an approach, as well as the challenges to conclude that when analysing digital data researchers should seek for signs, schemes, symbols and ethical “micro-moments”.

10.2 The Context of the Research

This research project started in 2018 and was completed in 2021. It employed qualitative methodology to examine how children are using IoToys at home and in ECE settings and to explore to what extent and how they can be integrated in pedagogy in England, Norway, and Australia. As IoToys are relatively new technological developments, it is important here to define them. These are tangible, physical toys connected with the internet which have intended pre-programme functions and represent either anthropomorphised characters or real/imaginary animals. Children can control these devices which offer opportunities for programming the interface to create interactive projects and actions involving children’s communication and expression (Palaiologou et al., 2021; Kewalramani et al., 2023).

As mentioned earlier, our research methods deployed visual methodologies. Visual researchers in the social sciences are using tools such as videos, photographs, drawings as modes of inquiry “modes of representation and modes of dissemination” (Mitchell, 2011, p. xi). Visual research is producing immediate visual text or, as Fiske (1991) has described, primary text. However, central to this is a need to interpret and analyse the images which does not come without its challenges.

In our research, we used multi methods to collect data. The main methods were participant and non-participant observations, collection of videos with children’s activities, photographs and photovoice videos that parents and ECE educators were sending us that they thought would be of interest in our research. It is important to

say here that we did not aim to have cross-cultural research, thus the methods of data collection varied among our countries. The focus of our research was to understand how children interact with haptic (involving sound, digital touch, movement) technology at home and in ECE settings, and how this technology can be integrated to enhance children's development and learning. The analysis of data subsequently followed a commonly agreed protocol and was derived from our theoretical lenses.

At this point, we have to explain that our project was affected by the outbreak of the COVID-19 crisis as data collection was suspended. In England and Norway data collection stopped in March 2020 but in Australia data collection continued via Zoom. In England parents carried on sending short videos of their children in the first phase of the lockdowns (March 2020–June 2020), however after a while and with the continuing nature of this crisis, they stopped and it was impossible to resume data collection after the lockdowns (the national lockdown finished 19th July 2021). In Norway, during COVID-19 the structure of dividing groups changed, and the groups of children with one educator became smaller (with one educator for a group of 4–5 children while previously 3 educators for 18 children). This temporary form/structure did not offer opportunities for data collection as this would have added an extra demand on the educators. In Australia, during the COVID-19 pandemic, the data collection pivoted to remote data collection methods. These involved data via children's live zoom-based play and conversations with the researcher where the adult was the 'silent partner' during the live play session (occurred once a week staggered around totalling 10 weeks in 2020–2021). In negotiation with the educators and parents, observations at home and in EC settings were gathered, but the nature of the observations varied across contexts. Parents and educators submitted multimedia (through a private WhatsApp group) messages (pictures, videos, short written reflections from parents) of children's play in the home. For the EC settings, the researcher provided remotely recorded stories involving empathy-based scenarios involving the robot or the digital game characters that were used as inquiry starters for the by the educators in their own EC setting. Hence the data also involved a combination of narrative observations from the researcher and self-submitted video.

As discussed elsewhere in the book, the pandemic brought dramatic changes in our everyday life affecting directly educational research with children at all levels and, across the world. There was a rapid move to use online tools and, in our research, we needed to develop online practices relying as ethically possible on visual data only. In a crisis individuals or group of people are impacted physically, emotionally, socially, cognitively, spiritually as it brings a disequilibrium to the normal daily routines (Male et al., 2024). In line with the ideology of the book that crisis offers opportunities for developing other possible ways and tools, for our project it offered the opportunity to utilise digital methods and examine in depth ways of not only collecting data but analysing these digital data with multimodal lenses as it will be discussed later.

10.3 Theoretical Conceptualisation: Vygotsky and Piaget: Beyond Dichotomies Seeking for Harmonies

In line with the aims of this book, we view play as a complex construct that can be studied by many disciplines such as psychology, sociology, anthropology. Equally trying to capture and analyse children's lived experiences in research comes with complexities especially when digital data tries to document and interpret these experiences. As will be explained below, in order to understand these complexities, our theorisation is seeking to harmonise the psychological dimensions of play within children's social and cultural contexts. Thus, as our aim was to examine children's play in the digital age, with emphasis on IoToys, our theoretical conceptualisation is based on synergy between psychological theories and social ecological theories of play.

Building on previous work from our research (Palaiologou et al., 2021), we developed synergistic lenses between the work of Vygotsky (1978) and Piaget (1977). Although we do not ignore the differences between Piaget and Vygotsky, we aligned with the work of Glassman (1994) who argued "that whilst Piagetian and Vygotskian psychology might have epistemological tensions due to different ideas, actually these differences are the key to help us to understand child cognitive development" (Palaiologou et al., 2021). In that sense we argue that both are examining the internal psychological functions (e.g., the role of thought, attention, object representation, imagination, symbolism) that leads to play. Both view that intellectual development occurs as a sequence of hierarchical levels. Piaget in his own words explains: "we do in fact find, in the analysis of forms of social equilibrium, these same three structures [...] [just as the] cognitive mechanisms in children involve three distinct systems" (Piaget, 1995, pp. 56, 279). Similarly, Vygotsky (1994, p. 216) suggests "Development consists in three intrinsic stages". Nevertheless, both acknowledged that "The stages of development are far from being just the manifestation of internal organic maturation" (Piaget, 1995, p.296).

We must, therefore, distinguish the main lines in the development of the child's behaviour. First, there is the line of natural development which is closely bound up with the process of general organic growth and maturation (Vygotsky, 1994, p.57).

Despite his critics, Piaget (1971, p.155; 1986, p. 312) explicitly noted the open nature of development of knowledge. Moreover, despite the dominant ideas in the English-speaking literature that the Piagetian work ignored the social and cultural variables of development, both endorsed these:

Human intelligence is subject to the action of social life at all levels of development from the first to the last day of life. (Piaget, 1995, p. 278)

The entire history of the child's psychological development shows us that, from the very first days of development, its adaptation to the environment is achieved by social means (Vygotsky, 1994, p. 116).

In Vygotsky's work it is obvious that his ideas moved from social to cultural dimensions of development. Equally Piaget (1995, pp. 41–47) showed a commitment with due attention to social relationships and the cultural availability of knowledge and values (Piaget, 1955).

Thus, in our work, we draw upon Vygotsky's view that play and its influence on child development conveys accurately that the child learns to act in a mental, rather than an externally visible situation, relying "not on motives and incentives supplied by external things" (Vygotsky, 1966/2016). Thus, play is "the source of development" (Vygotsky, 1978, p. 138) of "the most authentic, truest creativity" (Vygotsky, 1930/2004, p. 11); something that is instrumental in furthering children's thinking and fostering the development of ideas that "bridges the gap between real events in the changing world and the imagination within one's head" (Preissler, 2006, p. 233). Consequently, "we can view play from a holistic perspective that captures it as a genuinely social activity—which means not only an interactive activity but also a cultural and imaginative one" (Nikolopoulou, 1993, p. 13).

As Vygotsky (1976, 1978) has emphasised the importance of play in children's development, we cannot ignore that play is "an internal mental function for children to explore their world and the objects around them defined by a set of broad terms encompassing motivational, cognitive, social and emotional aspects of behaviour and psychology" (Neale et al., 2017, p.4). Similarly, Piaget (1977, 1985) argued that as children develop through stages, they construct schemata (= "a cohesive, repeatable action sequence possessing component actions that are tightly interconnected and governed by a core meaning" (Piaget, 1952, p. 7) to make meaning of the world around them through their experiences and central to this was play.

Thus, in this research, we view play as "an accomplished union of mental functions and sociocultural world" (Palaiologou, 2017, p. 1262) that shapes children's lives (e.g. Prout, 2010; Rogers, 2010) and is context specific and inseparable from the social world which drives the play experience (Brooker et al., 2014). In that sense, play cannot be examined in isolation from the developmental, social, cultural and ecological contexts of childhood, nor "be broken into parts for separate consideration" but needs to be seen as "moulded into one piece" (Alanen, 1988, p. 54). Therefore, in our research we examine children's play in a way that attempts "to find a relationship to both children's own activity [internal mental functions] and to the social processes which shape and constrain [or extend] children's lives" (Prout & James, 1997, p. 30). In doing so we seek to create a synergy between the developmental approaches to play as mental function and the ecological views of the child as part of a "moulded" social digital landscape.

As children are part of multiple social landscapes, we cannot serve research effectively by decontextualising play. Thus, we draw upon social ecology theory (Bookchin, 1993, 1995a, 1995b) to understand what happens at an internal and social level when children are interacting with IoToys. Social ecology examines ecological phenomena within society that "require a way of thinking that recognises that 'what-is' as it seems to lie before our eyes is always developing into 'what -it-is-not', that is engaged in a continual self-organising process in which past and

present, seen as a richly differentiated but shared continuum, give rise to a new potentiality for a future, ever richer degree of **wholeness** [original emphasis]" (Bookchin, 1993, p.5). It seeks to unify the study of natural (human development) and the social world "in a comprehensive theory that sees human beings and the natural world as potentially complementary, not antagonistic" (Best, 1998, p. 335). In that sense it goes beyond just studying phenomena within interface systems and is concerned with the holistic richness of them (Bookchin, 1995a). We position this project within social ecology as embedding a complementarity of psychological research and sociological research, creating synergy to examine "*what -is*" when children play with IoToys. We view social ecology as stressing the need for embodying complementarity between the internal (mental functions) and the social worlds that will give active meaning to *the wholeness* of play (digital and non-digital) across children's social landscapes. Such a lens allows us to examine children's play across digital and non-digital within the social and cultural context that this play takes place. Moreover, it helps to draw from the psychological dimensions of play as discussed by Vygotsky and Piaget to analyse the characteristics of play and within the social cultural lenses to locate this play in its social and cultural context. Thus, we built on this in order to offer us indicators and indications of how we can approach our digital data, as will be demonstrated below.

10.4 Data Analysis: Seeing the Unseen

In our research we sought to utilise a multimodal approach to analysis, emphasising the importance of using critical lenses that align with our theoretical conceptualisation. For example, a multimodal analytical approach allows researchers to consider multiple modes (speech, sound, text, digital touch, movement), wherein children's play is transformative as children move back and forth within their physical and digital play spaces (Edwards, 2021).

As our project was multi-dimensional to answer each research question several analytical methods were used. Preliminarily we used thematic analysis (Braun & Clarke, 2021, 2022). However, due to the nature of the research we also employed either an inductive or a deductive approach, based on our theoretical conceptualisation, so we could understand the psychological and social dimensions of children's interactions with IoToys. In cases where we wanted to analyse explicitly the content of the play, we used semantic and latent approaches (see Palaiologou et al., 2021). As mentioned already, our data was mainly visual either in the form of videos or photovoice videos from parents and photographs.

Visual data does not come without its challenges. It does require interpretation, thus we had to find ways to ensure that we interpret the data faithfully and ethically. We built on Palaiologou's (2019) suggestion that in order to analyse visual data we do need to set in advance indicators (coding) and indications (themes).

In line with our conceptualisation, we drew upon the psychological characteristics of play as our indicators, these included:

- Creation of imaginary situations with the use of objects (IoToys);
- Use of objects to attribute/project properties to other artefacts;
- Projecting imitation schemata onto other objects;
- Transformation of the objects into symbolic actions;
- Actions to represent something else rather than the intended functions of the objects;
- Creation of rules;
- Meaning-making;
- Child takes the role of the other—imitation (see Palaiologou et al., 2021).

The second stage was to focus on indications that evolved around the physical, social, emotional, linguistic and cultural-environmental dimensions of play. The example below demonstrates the process of the data analysis.

Example of data and analytical process:

This is a 1:02 min photovoice video that the parents sent to us (English data). The parents did not put any narrative as they wanted to leave the researcher to hear the children's dialogues, they just explained the context, that the boy who is older is helping his cousin who is younger to play with OSMO.

In this video (Fig. 10.1 presents screenshots of the video), we see that the older boy helps the younger girl and guides her using his fingers and language to help the girl to put the pieces in the right place. Sometimes he takes the piece and places it in the right place using language to explain what needs doing. The girl is showing attention and follows the instructions given to her by the boy. When the puzzle is completed, alongside the celebrating music from the OSMO, the boy claps his hands as an indication that he applauds her efforts and praises the girl for completing it. They both smile (see Fig. 10.2, Table 10.1).

Reflecting our theoretical conceptualisation, we extended our interpretation to conclude that in this play episode we see a flow of play where through problem solving (where the pieces need to be used to create a house), negotiation, social interaction between the two children, the boy supported the young girl as most



Fig. 10.1 Two children play with OSMO

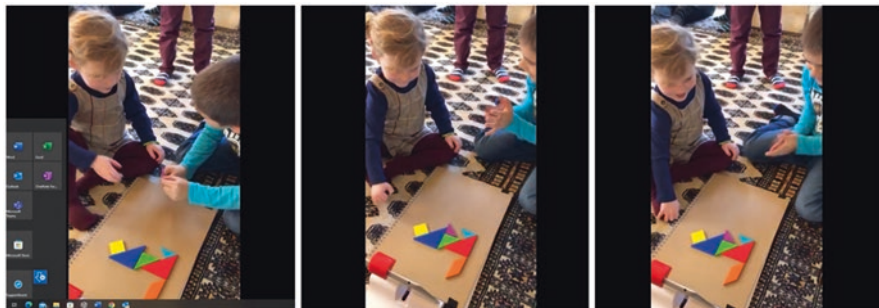


Fig. 10.2 Both the children celebrate the completion of the puzzle

experienced peer (zone of proximal development) to construct a new schema to understand the environmental culture of this particular play (OSMO and its rules) which enables the girl to feel achievement (completion of the puzzle), control (changed the image of the puzzle), develops sense of self-esteem and worth (the boy applauded her and she had a big smile at the end). Our analysis was communicated with the family, so the family could engage with our analytical protocol and, most importantly, to ensure that our narrative of the video relates to their narrative. Thus, following member checking process (Ary et al., 2010), to ensure truthfulness of our interpretation.

10.5 Discussion: The Case for “Micro-ethical” Moments in Visual Research

As can be seen from the above example, analysing visual data requires the development of strategies that are not different from written data. However, the visual data offers rich data as it captures embodied language that written text cannot always capture. It also offers researchers the “wholeness” of the context as it does not ignore the social/cultural aspects of the environment and the social-emotional interactions that occur within it. Nevertheless, visual data needs to be treated with caution as images do not always tell us/ represent the reality because in research “the invisible matters” (Wyly, 2010, p. 499). As visual methodologies are complex because the lived experiences of children cannot only be represented only by images, Wyly (2010, pp. 505–507) suggest three conditions:

1. Conditions of possibility (seeking for the unseen thus visually unknown contexts of the image and image taking process);
2. Displacement (an image might be removed from its contextual history);
3. Power of representation (who chooses and is in control of the images).

Table 10.1 The data analysis process

Indicators	Indications	Analysis	Interpretation
Creation of imaginary situation with the use of objects (IoToys)	Physical, Social, Emotional, Linguistic, Cultural-environmental.	The boy with his facial expressions pretends aggression, imitating the monster that is showing on the iPads screen With the use of language attempts social communication (use of phrases like “come on you can do it”, “shall we try to put this here”?)	Here we can see the physical, social and linguistic dimensions of play
Use of objects to attribute/project properties into other artefacts	Physical, Social, Emotional, Linguistic, Cultural-environmental.	This was not found in this episode	
Projecting imitation schemata onto other objects	Physical, Social, Emotional, Linguistic, Cultural-environmental.	This was not found in this episode	
Transformation of the objects into symbolic actions	Physical, Social, Emotional, Linguistic, Cultural-environmental.	Once the pieces are lined up (see fig. 1), the young girl says: “I made a train, made a train”. The boy replies: <i>No we are making the monster.</i> Girl: no, no I want to make a train. So, the boy changes the screen and puts up a house by mistake. Then the girl replies: Yes, let’s make a house, we can live in there! And the interaction continues, and they complete a house	In this instance we see that through negotiation we have the start of symbolic actions, the image of the house is transformed into an imaginary house where the girl wants to live in.
Actions to represent something else rather than the intended functions of the objects	Physical, Social, Emotional, Linguistic, Cultural-environmental.	Not found in this episode	

(continued)

Table 10.1 (continued)

Indicators	Indications	Analysis	Interpretation
Creation of rules	Physical, Social, Emotional, Linguistic, Cultural- environmental.	Both children followed the rules of OSMO	Although both children followed the rules, they showed flexibility as they changed from instead of making the monster to make a house through collaborative negotiation
Meaning -making	Physical, Social, Emotional, Linguistic, Cultural- environmental.	The boy used his body to communicate his praise when the puzzle was completed (clapped hands and smiled)	Meaning making can have several forms and is expressed in an embodied way
Child takes the role of the other—imitation	Physical, Social, Emotional, Linguistic, Cultural- environmental.	Not found in this episode	

Thus, we conclude when visual methodologies are used in research with children, the methodology needs to be considered differently, compared to other methodologies. We propose that researchers using visual methodologies need to be guided by the cultural context of the research focus, its historicity and show sensitivity to it. We propose that in the visual research landscapes in early childhood (but and beyond), the focus should be on these sensitivities and these to be considered as micro-ethical moments, where researchers' judgements are attuned to cultural historical landscapes of children's lives. It should be acknowledged that in any interpretation of digital data, no matter how rich and insightful can be, these moments of children's lives may go unrecognised. Thus, researchers in the digital analysis stage should be intuitive to recognise the micro-ethical moments that emerge.

Core to visual research are the ethical considerations, especially when it comes to anonymity and confidentiality. As children's images are represented in visual data, researchers when disseminate findings tend to "anonymise" the images of children with covering or blurring their faces. However, this raises the questions as to what extent children want to be anonymised in this way. Anonymised images, instead of eliciting children's voices, can dehumanise children. As visual data is rich linguistically, physically, socially and emotionally, in anonymising images we run the risk to make the data silent, manipulates the data (e.g., displacement) so it speaks to an audience distant from the children and in some cases, it can lead to unrecognisable and meaningless data as in the examples below:

Similar challenges can be raised regarding confidentiality as in our attempt to align with it we run the risk of depersonalising the lived experiences of young children, rather than capturing them. There are cases where the ethical positioning, protocols, and the ethics of care of the researcher are against the participants'



Fig. 10.3 Anonymity vs dehumanization

wishes, the contextual features of the data and children's empowerment in the research as the example below illustrates (Fig. 10.3).

In the above example with the boy and the girl once the case study was written for dissemination purposes and we showed the family and the children how we had interpreted the photovoice video. The parents were happy, but the boy asked why we did not use his real name and he did not like how his face was covered. We explained the reasons however, the boy insisted to use his real name and not cover his face as he stated, *"I am proud that I helped my cousin and I want everyone to know"*. It can be seen these created tensions between our ethical protocol, but then if we had not respected that child's wishes it would place a question on the participatory nature of our research as well as children's agency.

Such tensions create challenges at philosophical and practical level. At the philosophical level visual research with young children can result in "silent" ethical conduct, regulated by a self-interest in the investigation. This sums up researchers' duties and obligations to avoid pursuing an axiomatic argumentation of the ethical terrain of visual research. At a practical level, ethical choices depend on individual's morality and ideology (such as children's participation as a frame of reference) and intuitional morality (such as regulations, ethical codes and committees) as well as legal requirements. Thus, we argue that visual research with children should place emphasis on **"micro-ethical"** moments: i.e. child in context (procedural ethics vs situated ethics) and their voices and choices heard and acknowledged.

Consequently, in reflecting on our theoretical conceptualisation that aimed to synergise psychological and philosophical theories, we propose the following reflective lenses when visual research with young children is considered:

- Each visual researcher should reflect on the adopted actions of pursuing their own research investigation that on the surface appear ethical as a 'betterment' way of children's involvement (**rational egoism** = it is rational to act in children's interest);
- In striving to act ethically, the issue of consent, anonymity and confidentiality should take a pragmatic approach, rather than epistemic one, that does not ignore the array of issues that shape axiomatic ethical dilemmas on visual research with young children (**psychological egoism** = researchers can only act in their self-interest);

- Each visual research should seek to match ethical criteria set by institutional regulatory bodies and committees with the axiomatic ethical challenges emerging from visual research that does not always sit comfortably with institutional ethical protocols (**ethical egoism** = researchers ought to act in a way that will benefit the children)

10.6 Conclusions

To conclude, visual research with young children has reached an important point where the legal and institutional requirements for informed consent, anonymity and confidentiality are determining decisions about ethics. In line with cultural-historical theory, we propose that the ethical terrain of visual research ought to be determined by invariable different principles that are depending *on context and situational actions*. Informed consent in visual research should be constantly negotiated for each visual depiction with the children if we are to represent children's lives in research.

Axiomatically, it is paradoxical to assure anonymity and confidentiality in visual depictions. Instead, visual research should be accommodated in a *context specific visual ethic*, moving away from the pragmatic margins of institutional ethical protocols of what is "good" practice (ethical egoism). We propose that ethical visual research should be *context specific* and should be managed and regulated by reference to reasons appropriate to that context. It should be concerned with an axiomatic understanding of what it is required conducting ethically sound visual research with young children. Finally, this has implications for institutional ethical protocols as they should be negotiated in participatory ways so they can be flexible to focus on micro-ethical moments that lead to ethical decision making and reflect the epistemic positions and axiomatic challenges of visual research with children. To put it simply, in visual research we should publicly debate ethical anxieties and dilemmas and *not be haunted* by them.

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Chapter 11

Digital Methodology Beyond the Everyday: Analytical Model for Interpreting Inclusion of Children with Disabilities in Preschools



Fatema Taj Johora , Marilyn Fleer , and Marie Hammer 

Abstract Recently research on inclusion of children with disabilities in mainstream settings has advanced. But approaches for studying inclusion in the living laboratory of a preschool are still limited. Certainly, it is a delicate job for researchers to capture pre-schoolers' perspective and their contribution in their development through everyday participation in an early childhood setting. This chapter discusses how digital methodology enable researchers to accumulate everyday experience of children with disabilities along with their peers in a mainstream long day care centre and to interpret beyond the everyday practices. In this process, we felt it is essential to use appropriate theoretical or analytical tools to bring deeper dimension in analysis and to address interpretation challenges. This chapter argues both the digital methodology and cultural-historical analytical tools make it possible to develop new understanding of inclusion and to understand how participant children created roundabout ways for their inclusion in the preschool practices. A model accompanied by five key principles are presented, and a working example illustrates the kind of data generated.

Keywords Digital methodology · Inclusion · Disability · Cultural-historical · Play · Preschool

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11.1 Introduction

The aim of this chapter is to discuss the dialectical interplay of a digital methodology and a cultural-historical theoretical perspective to support researchers to generate data within the dynamics of a living laboratory of a preschool setting in order to create new understandings of inclusion within everyday practices. We begin this chapter with a model developed from research (Johora, 2020), followed by examples of data to illustrate five key principles of researching inclusion within play-based settings. We conclude the chapter by drawing together the five principles of a digital methodology for capturing how participant children created roundabout ways for their inclusion in the preschool practices.

11.2 Crises in Capturing Children's Perspective

Research to capture pre-schoolers' perspective, crises they experience and their contribution to their own development through everyday participation in different settings is challenging. Traditional methods like interview and questionnaire are not suitable to researching children's perspective. Traditional observation is a child-friendly research method, but it is difficult to translate children's actions into detailed text. The first author used traditional observation method in some of her studies and experiences the following crises:

- Simultaneously paying attention to the live interactions in a setting and note taking
- Carrying data in memory and translate those into the observation notes
- Overwhelming exercise in going back and forth through text

Therefore, she felt that much of the real interactions in a setting was dropped in the process of data collection and during analysis she found many nuances were missing. Moreover, as an inclusive education researcher, the first author was struggling to find and use appropriate theoretical tools in her studies. Such methodological and theoretical crisis the researcher felt about her knowledge and practices inspired her to explore further as Fragkiadaki et al. mentioned in Chap. 7 that crises are turning point for many researchers to develop or reshaping their "*researcher identity and personality*". Next, we will discuss how we found the digital video observation method most relevant in capturing children's perspective- especially who are young and vulnerable; in Chap. 8, O'connor et al. discussed in detail about the challenges in researching with very young children.

Analysis of children's drawings and photos may give some ideas of their choice, motive, and preferences, but those methods are also limited because those cannot capture children's actions in motion and thereby connecting the puzzle pieces into the broad context or social situation in which actions are taking places becomes challenging. However, connecting the data to the context is a sophisticated act of interpretation. Therefore, digital observation or video recordings have been found

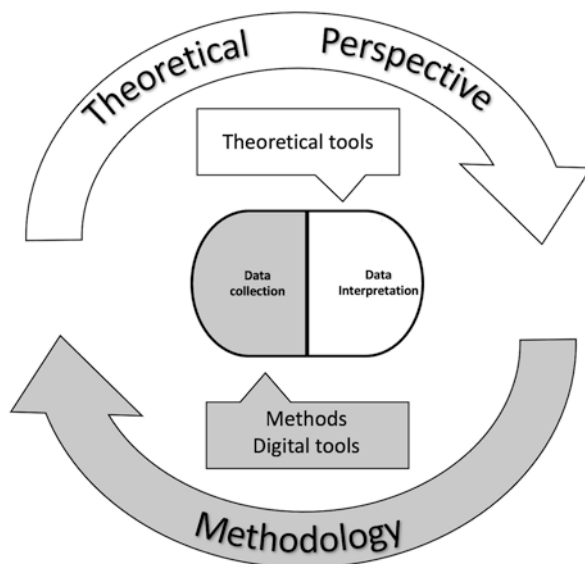


Fig. 11.1 The dialectical relations between theory and methodology in researching and knowledge generation

beneficial for capturing children's actions in motion. Because of technological advances, it is now possible for researchers to capture the children's actions, interactions, expressions within particular situational contexts and later revisit these lived actions during data analysis. Consequently, many researchers prefer digital video methodology while they research lived experiences, and when researchers are dynamically involved with young children in the research context of a living laboratory. In the model that follows (Fig. 11.1), we will discuss how the digital video methodology along with the cultural-historical theoretical perspective helped us to capture children's perspective in motion and to analyse the data to answer research questions. A series of research principles are presented.

11.2.1 Principle 1—Beyond the Technical Capture (Hardware to Software)

The way news reporters use digital video recorder for their filming differs from the researcher because the aim of recording or underlined professional practice and perspectives are different. Similarly, although many researchers are using the digital tools to collect data, the use of digital tools varies based on their research perspective. The digital tools (e.g., video camera, Go pro) can be seen as hardware and the theoretical perspective and methodology can be seen as software, which guide the operation of the digital tools in the process of data collection and analysis. The

dialectical relation between the theoretical perspective and methodology guide researchers in finding appropriate tools or methods for data collection and analysis and thereby influence the research outcomes (see Fig. 11.1). Researchers choose their method based on their theoretical perspective and then design their study and select appropriate method/s to collect data, following the methodology or theorised stance on the selected method. After collecting and organising data, researchers again need theoretical tools to analyse the data. Thus, through a complex process, the researchers reach their findings and that contribute to what is known about the area, but also they can contribute to theory. Therefore, the methodology and the respective method a researcher chooses has impact on their findings and there by influence theory development. Vygotsky (1997) mentioned that an appropriate methodology is an essential prerequisite for research and at the same time it is result of its application. Figure 11.1 shows the relationship between theory, methodology, methods, and findings.

11.2.2 Principle 2: The Whole Rather Than a Fraction

Vygotsky (1993) criticised the existing psychological theories and experiments to understand children with disabilities and attempted to develop a new understanding of a special pedagogy. Not only did he create a new understanding about special pedagogy, but he pointed out the existing methodological crisis when researching the development of children with disabilities. In this endeavour, Vygotsky simultaneously researched basic developmental issues of children with disabilities and all other children to get the results (Knox & Stevens, 1993). “Many scholars have pointed out that Vygotsky’s approach to psychology was above all methodological” (Knox & Stevens, 1993, p. 11). Vygotsky tried to bridge the gap between psychological scholarship and everyday reality through his research. His emphasis was to analyse the child development as a whole, rather than a fraction (Vygotsky, 1993). Following Vygotsky’s legacy, Hedegaard (2012, 2019) developed a model of researching children in a wholeness approach.

As discussed above, the theory also guided us in our selection of a cultural-historical methodology for theorising new approaches not available in Vygotsky’s time. We used cultural-historical theory to inform our approach of a visual observation method using digital tools. The theory also guided us in how to use the tools in the data collection process. We also drew upon contemporary data organization and interpretation techniques. For our study, methodologically we followed Hedegaard’s (2008) three layers of interpretation, and we used Vygotsky’s theoretical system of concepts, notably those in Volume 2 of his collected works (Vygotsky, 1993) to understand children’s participation in a mainstream preschool setting as a whole.

After data collection, the raw digital data were organised in digital files and folders, and a video log was created to describe the data files. In the first layer of analysis, common sense interpretation (Hedegaard, 2008), raw data were summarised as it can be seen in the column 3 & 4 in the Table 11.1. In the second layer, situated

Table 11.1 Participation of Malilha, a unity of the child and preschool practice (Johora et al., 2021, p. 1265)

Activity settings	Communication purpose	Conditions created		Tools in use
		In preschool	By Malilha	
Everyday routine with concrete tools				
Breakfast time (Vignette 1)	(i) to want more bread (ii) to inform her choice about fruit	Facilitated the meal setting The culture of valuing children agencies to ask and to choose	Holding up the plate to get attention strategies to point the fruit pieces directly	Empty plate Pieces of fruits
Lunchtime (Vignette 2)	To want garlic bread	(In addition to above conditions) The educator's effort to understand what Malilha was asking for	Trying to pronounce the words	The piece of garlic bread
Group activity with semi-abstract tools Circle time (Vignette 3)	To response teacher's questions	The circle time practice Provide picture cards Adult-child conversation	Spontaneously answering the quizzes Adding gestures and facial expressions	The picture cards and gestures
Shared context and abstract tool Teacher lead activity (Vignette 4)	To response teacher's questions	Setting up the imaginary situation Encouraging students to play and imagine Providing options in questions e.g., "You saw big stars [or] little stars?"	Using gesture with verbal communication	The imaginary spaceship
Experience sharing with imaginary tools				
Outdoor free play (Vignette 5, Part 1)	To share the funeral ritual	The physical environment Child agency to choose her activity and materials Attention from educators	Collecting imaginary material Initiate conversation	Firecrackers and food (Imaginary) (Adult as an auxiliary tool)
(Vignette 5, Part 2)		Supporting the child to express and confirming their understanding Questions with options	Choose an adult to share her story Used imaginary materials	
Experience sharing with abstract tools (Vignette 6)	To share the experience of enjoying theatre show	Educator's effort to understand Questions with options	Following the educator Self- regulation Different strategies to grab educator's attention	(Adult as an auxiliary tool)

practice interpretation (Hedegaard, 2008), we looked for the basic categories have been arisen from the common sense interpretation throughout the data set to understand the preschool practice. For example, the Table 11.1 presented the wholistic scenario of the communication between the focus child and the preschool practices. In the third layer, thematic interpretation (Hedegaard, 2008), we used system of theoretical concepts to analyse relationships between categories in context to answer research questions in a wholistic way (see principle five, Fig. 11.3).

11.2.3 Principle 3: Beyond the Clinical Setting and into the Living Laboratory

The first author found in different studies (Ahsan et al., 2013; Johora, 2012; Johora & Ahsan, 2015) that mainstream teachers and educators has many concerns about the inclusion of children with disabilities. Most importantly, they reported their lack of knowledge and skills to address special needs of children with disabilities. Similar findings are also common in different geographical locations (Agbenyega & Klibthong, 2014; Majoko, 2016). The first author also found that within this challenging context some children with disabilities were progressing well in mainstream settings and some were struggling (Johora, 2006). Therefore, she aimed to explore how children with disabilities are participating in mainstream preschool settings and collaborated with second and third authors. The first author was keen to use the digital video methodology as she chose cultural-historical theoretical perspective to explore the central phenomena. Moreover, her previous research experience was limited to using interview, questionnaires, focus group discussion and classroom observation with checklist and she found limitations of those methods to capture the interactions in detail. Through her collaboration with her co-researchers, she designed her research to go beyond the clinical setting using traditional techniques, and to capture inclusion in action within a living laboratory of a preschool setting.

Even in contemporary studies, researchers capture the actions of children with disabilities, and many use digital tools to film children's activities in a clinical setting or in a segregated setting (e.g., to withdraw children from their regular group), rather than understand children's actions in the regular settings of their life. Moreover, how a researcher enters into the setting, where the child participates and how they target the actions and activity settings, varies based on the researcher's theoretical orientation. For example, as a cultural-historical researcher, we enter into the setting with a cultural-historical conception of children's development and the importance of social interactions in their development. A cultural-historical conception of child development guided us as researchers as we examined the possibilities of participation by children with disabilities, and we were also alert to the secondary disabilities they may experience in the participating contexts.

For instance, in our study, we examined the participation of a child with Soto's syndrome (Pseudonym: Maliha, 4-years old) in an Australian mainstream long day care preschool setting. The first author and a research assistant followed the child with a handheld camera in different activity settings. The data showed the child's speech was not clear and both the child and educators experienced communication difficulties. The educators' challenge was with understanding the child's intentions. However, our theoretical and methodological positions helped us to unpack the interplay between the child's different bio-psychological structure and the social consequences or secondary disability in the long day care preschool setting. We were able to map the child's roundabout way of participation and the way the educators created support within the preschool practice.

How we moved from digital to text-based analysis, can be seen in the example of a vignette taken from the overall study (Johora et al., 2021, pp. 1262–1263)

Vignette: Last night, Maliha went to enjoy theatre show *Lion King*. She wanted to share this with the researcher but the researcher could not understand. Then, Maliha chose to approach **the** educator, Amanda. Here is the brief description of how the communication went. The time is according to the movie file.

- | | | |
|--------|---|---|
| 22:20: | Maliha: | This is so much fun ...[She added something more, but the researcher could not understand], my sister... [She was jumping in joy] ...a dad die [bending body she was playing the role of 'die'] |
| | Researcher: | Who die[s]? |
| | Maliha: | Son of lioking [Lionking]...pay ticket... [she clapped] |
| | Researcher: | Oh tickets...! [The researcher could not understand] |
| 23:26: | Maliha approached Amanda to tell her story | |
| | Amanda: | Let me change my jacket... |
| | [Maliha was waiting for Amanda at the door] | |
| 26:40: | Amanda sits down to listen to Maliha | |
| 26:57: | Amanda gave attention to other children riding on a bike. Maliha was following Amanda | |
| 27:55: | Maliha, patting on Amanda's hand, said 'Awa awa awa' but another child wanted help from Amanda to tie his shoelace. | |
| 28:18: | Maliha again touched Amanda but another child comes to complain. Amanda had to chase the child as the child was chasing his peer. Maliha was following her. | |

However, Amanda was distracted from the conversation as she was gradually being involved in ensuring no fighting, discussion with other educators and, finally, riding on a tricycle.

- 35:37: Maliha was stopping Amanda's tricycle by widening her hands.
- 37:40: Amanda apologises to Maliha for not giving attention to her.
- 38:30: While Maliha was taking time to say something, another child tries to get Amanda's attention. Amanda indicated the other child 'ssh'
- 39:25: The child could not wait anymore and distracted Amanda
- 40:50: Amanda was listening to Maliha. Suddenly another child came in between them. Amanda said, 'hang on ... Maliha was talking, honey'
- 41:10: Amanda got the clue from Maliha's phrase 'lion king'
Amanda: 'Was that real people or cartoon one?'
- 41:30: Amanda was sharing Maliha's experience excitedly with another educator and she informed Amanda that yesterday Maliha was picked up early. Finally, it helped educators and the researcher to understand that Maliha went to watch the Lion King (theatre version) last night.

We moved from the text to summarising the data in relation to the concepts guiding our research, where the unity of the child and context was central part of our theoretical stance - cultural-historical theory. Table 11.1 is an example of how the everyday preschool practices (Column 3) and the child's participation (Columns 3 and 4) were documented in summary form as part of the analysis process. What is important to note, is how the child's participation is a unity of the preschool practice and the child's intentions (shown in the second column) in the activity settings (shown in first column) (See Johora et al., 2021).

11.2.4 Principle 4: Capturing the Dynamic Process Over Time

In line with Vygotsky's research approach, we have observed both children with disabilities and children without disabilities to understand the inclusive participation of children with disabilities. Traditionally, researchers would prefer to observe children with disabilities only if the research aim is to explore the participation or

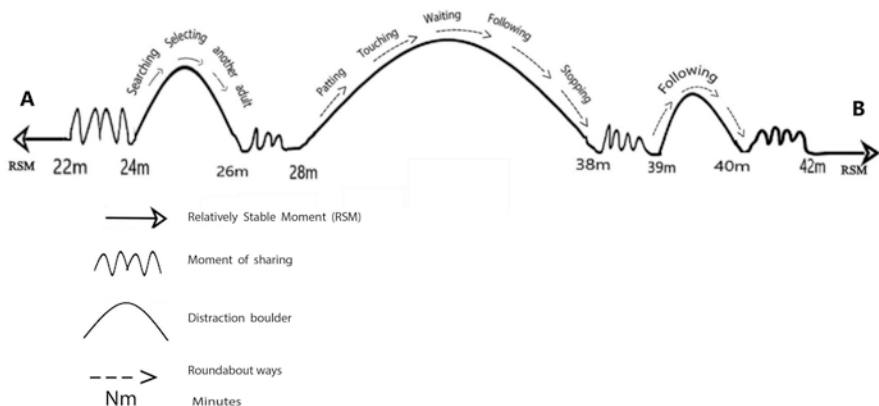


Fig. 11.2 Maliha’s roundabout ways to reach the goal of verbal communication: A dynamic process over time (Johora et al., 2021, p. 1264)

development of children with disabilities. This holistic process enabled us to collect quality data and interpret those beyond a surface level and to capture development over time—as a dynamic whole process. In Fig. 11.2, we show an example of how the child’s development can be mapped over time to give a fuller account of the actions of the child in the preschool setting, where crisis points can be captured. Figure 11.2 is an example from the data set to showcase how the focus child overcame the communication difficulties and achieved the communication goal creating a roundabout or alternative way (Vygotsky, 1993) in the mainstream preschool practices.

The link between the vignette presented above, summarised as a synthesis between person and environment in Table 11.1, and then mapped over time is shown in Fig. 11.2. These processes as guiding principles are key dimensions of interpreting data from a cultural-historical perspective.

11.2.5 Principle 5: The Final Theorised Model Is Located Within the Literature and Research Paradigm of the Field

The results of research are also analysed in relation to the literature and the dominant models available to the researchers. Cultural-historical theory gives alternative ways of interpreting and theorising the results. Figure 11.3 is an example from the first author’s overall study which took forward four separate cases (using the process described above) to bring forward new understandings. But the model shown in Fig. 11.3 did not just happen. It emerged from a synthesis of what was known

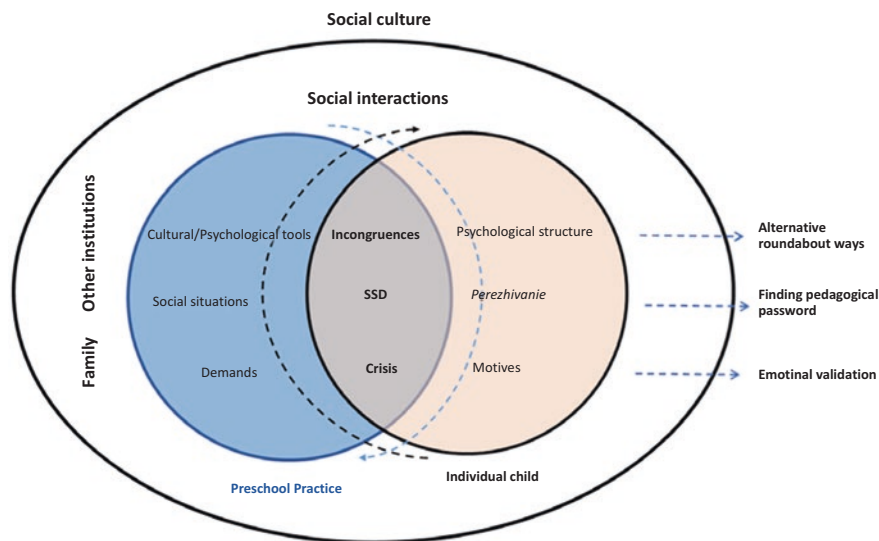


Fig. 11.3 Cultural-historical model for enabling inclusion (Johora, 2020, p. 246)

from the existing research paradigm and the incongruence that was observed through the cultural-historical study of the first author (Johora, 2020).

For instance, the biomedical model still has its influence in special and inclusive education for children with disabilities (Bøttcher, 2012). The biomedical model explains disability as the individual's problem and focuses on the difficulties an individual with disabilities experiences rather than their strengths. The social model of disability challenged this notion of medical model and argued that the difficulties persons with disabilities experience are created by the social situations or practices and removing these barriers are crucial to ensure participations of persons with disabilities. The implication of social model helped us to consider in our research how the child/educators reduced the barriers in the preschool practices and to understand what better practices for access to services for persons with disabilities might be (Oliver, 2013). However, the social model also has limitations as it does not have theoretical tools to explain disability and development. Therefore, we choose cultural-historical theory for our study. Cultural-historical theory focuses on children's development and education in relation to children's participation in different social settings. Vygotsky's cultural-historical theory also explained about disability, development and inclusion of children. Vygotsky (1993) mentioned about two aspects of disabilities—primary or biological aspects of disabilities and secondary or social consequences of biological disabilities.

Vygotsky (1993) argued that the basic law of development for both children with disabilities and children without disabilities are same but children with disabilities may need an alternative way or by-pass to reach the same developmental goal/s. For an example, Vygotsky (1993) mentioned that a child with visual impairment may read an alternative braille text, but the basic law of reading skills development is

same for both the children with visual impairment and children with vision. Vygotsky's cultural-historical theory guided us to understand the interplay of biological and the social aspect of disability and development. Furthermore, it also provided us the theoretical tools (e.g., secondary disability, roundabout way or alternative way of development, motive and demand) for data analysis.

Figure 11.3 shows how the results and their implications can be further theorised into a structural model that pushes against the existing models of inclusion. The Fig. 11.3 highlighted the dialectical interplay between the child and the preschool practices and the resulted crisis or opportunities for the child and how the child could be supported. For example, the focus child, Maliha, experienced incongruences because of unique psychological structure and the demand of using commonly used verbal communication tool in the preschool. In this case, alternative or roundabout ways could be created to support the child (e.g., speech therapy to master the commonly used verbal communication tool or sign language as alternative cultural tool).

11.3 Conclusion

In this chapter, we showed how in the context of inclusion, researchers can analyse data. Five principles were presented and shown through examples of data. They were:

Principle 1: Beyond the technical capture (Hardware to software)

Principle 2: The whole rather than a fraction

Principle 3: Beyond the clinical setting and into the living laboratory

Principle 4: Capturing the dynamic process over time

Principle 5: The final theorised model is located within the literature and research paradigm of the field

When these five analysis principles are taken together within the relational model shown in Fig. 11.1, we can argue that both the digital methodology and cultural-historical analytical tools make it possible to develop new understanding of inclusion and to understand how participant children created roundabout ways for their inclusion in the preschool practices. The model and the principles work together as a dynamic whole, and bring forward for the researcher, a value framework for analysing data generated through the methodology and method of cultural-historical theory in contemporary times.

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Part III
Digital Artifacts and Educational
Experiments in the Family Settings

Chapter 12

Unpacking Digital Educational Experiment in the Home Setting: Crisis, Relational Proximity and Distal Participation in the Times of COVID-19 Pandemic



Prabhat Rai , Marilyn Fleer , Glykeria Fragkiadaki ,
Elin Eriksen Ødegaard , and Alicja R. Sadownik 

Abstract There are methodological challenges of studying children’s development in-motion, these challenges were further accentuated in the times of COVID-19 pandemic. The challenge demanded novel thinking from researchers in responding to the crisis and also preparing for new realities post-pandemic. This section has chapters that extends this discourse and further theorises the role of digital tools in capturing children’s development as a dynamic and dialectical process. The methodological argument presented here shows how educational experiment were conducted via digital tools to create motivating condition for children’s STEM concept formation in the home setting in Australia. This chapter especially reports on the methodological aspects of developing digital educational experiments and the changing ‘role of researcher’ as a *distal participant*. During the pandemic our object of inquiry, children’s home practices underwent a transformative change. In these changing material conditions digital educational experiments were developed as a methodology to work in collaboration with families so that we can continue to offer children in early years a new motivating condition for learning. While working with

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families a number of digital tools were used to build common knowledge that was used to develop a responsive and relational pedagogy for children in early years.

Keywords Relational pedagogy · Practice · Institutional demand · Common knowledge

12.1 Introduction

Crisis as a methodological principle is not a self-explanatory concept but needs to be developed. This development demands philosophical unpacking and discerning the idea at the level of praxis. This chapter makes an attempt to start engaging with some of these ambitions around the concept of crisis and use of digital tools as a tool to transform our social situations.

It is worth going back to Vygotsky's valuable insight that at the base of ontogenesis lies the complex merging of two lines of development- the biological and socio-cultural (Vygotsky, 1998).

only man in the process of historical development has risen to creating new driving forces of behavior, only in the process of historical, social life of man did his *new needs arise*, form and develop; the *most natural needs underwent a deep change* in the process of man's historical development. (Vygotsky, 1998, p. 11, emphasis added).

The COVID-19 pandemic and the cascading effect of the it has brought some of the deep changes in our social practices and hence also ways of researching. This demands further methodological theorisation to think about the role of the researcher. Being close to the field and collecting data on participant's everyday live while being immersed in the setting was considered probably one of the best ways to develop a wholistic understanding of a phenomena but that opportunity of being in the field became practically impossible with the multiple lockdowns and regulations and lack of access to early learning centres, schools and families. The argument presented in three chapters in this section suggest that in these challenging times Conceptual PlayWorld, a model of intentional teaching developed by Laureate Professor Marilyn Fleer offered a possibility of developing relational and responsive pedagogy for children in their early years. The work uses methodology of educational experiment which builds on collaboration with the researched person/s and having a boot strapping model where participants could also contribute in shaping the new developmental conditions. While emphasising on the role of the researcher as central to such a methodology the chapters in this section (Chap. 13, 14, 15, this volume) shows that even when researcher/s participated as a distal participant they developed a relational proximity with the participants.

There is a need to move away from conceptualising children's development as genetically determined and fixed in age-gradation. Challenging this ontology Piaget argues that "what is needed instead is a radically cultural conception of *childhood*, one that acknowledges the historicity of the conception, and therefore also the

extent to which the category essentially transcends the biogenetic characterization; and that also acknowledges the extent to which the biogenetic characterizations themselves mirror different cultural and historical norms” (Wartofsky, 1979, p. 192).

12.2 Crisis: A Concept to Navigate and Understand in-Flux, Plurotemporal World

The COVID-19 pandemic created a state of crisis at societal level that led to new demands. These demands were created as our fundamental ways of human functioning and organising life in physical proximity in institutional spaces had to be changed due to the COVID-19 virus. The demands of practice itself i.e. schooling, learning, teaching etc. did not go away but the way of responding to this had to be changed. It was becoming evident that most of the existing social demands underwent deep change. Both the material conditions and processes used to respond to them had to be responsively developed using digital technology. It is worth highlighting at the outset that *crisis is not only a positive force but also a painful and excruciating phase*. One of the challenges in the moment of crisis is that our most natural needs are thwarted or are forced to transform. The COVID-19 pandemic brought a set of guidelines on physical distancing and uncertainty about human survival and hope. The crisis at the societal level forced changes in needs, tendencies, interests and ways of functioning. It led to a transient and volatile phase which sometimes seemed relatively autonomous from previous ways of living (which we are calling relatively ‘stable state’ for ease).

So, we were living in a transient phase in terms of time where we were worried of the future, navigating present demands and reflexively more aware of previous ways of functioning.

It is difficult to locate crisis in chronological sense of time, it is distinct from past, present and future. It is a time of acceleration, urgency, uncertainty, new demands and new potentialities and transformation. Crisis is not a source or driving force outside of development but mediates and set in motion the processes of development.

The crisis is a moment marked by uncertainty about the future, suspension of existing daily routines and habits. Moreover, it is also a moment of heightened emotional response with an urgency to take action even without fully understanding their consequences. It is impossible to plot all these developments in a single stream of time. Thus, crisis makes us more fully aware of an in-flux and plurotemporal world in motion.

As argued in the introduction to the book (Chap. 1) crisis also demands reviewing our theoretical tools in the context of changing reality. Research practice is a social practice as Kemmis (2009) has argued. The concept of crisis challenges the linear accumulation as knowledge development, it talks about complex relationships in the continuity and discontinuity in human social situation.

The term crisis here is not used in macro-cultural sense but to highlight recurrent demands emerging in the activity settings as researchers were working with families in creating new motivating conditions for their children's imaginary play and STEM learning (in the Conceptual PlayWorld). These methodological demands of collaborating with families were rough grounds of development of new practices. The chapters in this section shows that

- understanding and engaging with crisis was central to developing new motive orientations as a researcher;
- capacity to think about agentic action as incomplete forms which creates possibility for collaborative action was central;
- building common knowledge (Edwards, 2011; Rai, 2019, 2023) between the researcher and researched person for developing a socially articulated understanding of the commitments of the practice that creates demand on individuals.

12.3 Dialectical Interactive Approach – a Reflexive Note

Hedegaard (2004) has researched the construction of childhood and development within the framework of the institution, society and the individual. Her work is particularly powerful in that it draws extensively upon Vygotsky's (1998) seminal critique of child development, but specifically examines contemporary contexts, where there is cultural and linguistic diversity. Hedegaard (2004) views development as the relationship between the child and society to be found in the social situation of development that the child is able to create. To conceptualise a holistic approach to understand children's learning and development she considers institutional practice and individual activity in the institutional setting as the key. She has argued that "[p]ersonal activities are not systems but processes, and therefore they are not concrete manifestations of institutional practice; they are not inscribed into each other but influence each other dialectically. A person contributes to his own institutional conditions and the perspective of his society; therefore, institution and person both have to be conceptualized as contributing to practice in a theory of children's development." (Hedegaard, 2009, p. 65).

In Hedegaard's work, motives are seen as an integration of demands from environment and from children, into psychological forces in children's activities. She has argued that studying children's development from a holistic approach should be focused on their participation in the activity setting. The demands children meet in institutional practices are central to understanding their motives (Hedegaard, 2012, p. 18). This theorisation conceptualises a dialectical relationship between the three layers- societal (macro-sociopolitical and economic situation), social situation (as experienced by the individual in their institutional setting) and social situation of development - "a completely original, exclusive single and unique relation between the child and reality" (Vygotsky, 1998, p. 198).

To extend these ideas Hedegaard (2008, 2012, 2020) proposes a model of relations between society, cultural traditions, institutional practices, activity settings and children's activities and motives. It is worth noting that in the times of uncertainty and emergent crisis new practices were emerging to respond to the recurrent demands. The interesting aspect of crisis is that it challenges our matured functions and ways of functioning. In this 'transitional state' where society was still navigating its response to the pandemic some of the new set of demands were emerging from our efforts to satisfy our previous existing needs in the 'stable period' and a set of new demands also emerged because of the dramatic turn of events and uncertainty, another important feature of crisis.

These practices do not fit neatly into the previous theorisation. Some of the challenges of the transitional states are mentioned in the model below (Fig. 12.1).

Crisis blurs the boundaries between multiple institutions and traditional categories of economics, politics, social and moral are all collapsed. So, a multilayered destabilisation is experienced. In her writings Hedegaard (2008, 2012, 2020) and Hedegaard & Edwards (2023) uses three interrelated concepts: (i) societal, (ii) social situation and (iii) social situation of development to encapsulate and make a case for wholistic and dialectical-interactive understanding of the children's development. These categories are dialectically related and becomes explicit in social practice which are sustained through our social interaction. As the nature of practice changed it also blurred boundaries between practices. It is worth acknowledging in the times of crisis these institutional practices and activity settings have gone through a huge change itself. In stable state preschools and early learning centres are institutions designed and mandated with the purpose of negotiating societal demands of educating and caring for children in early years. The crisis led to creation of new demands where home setting was entrusted to also act as a school, office, preschool in addition to the already existing demands of caring for children (Fig. 12.2).

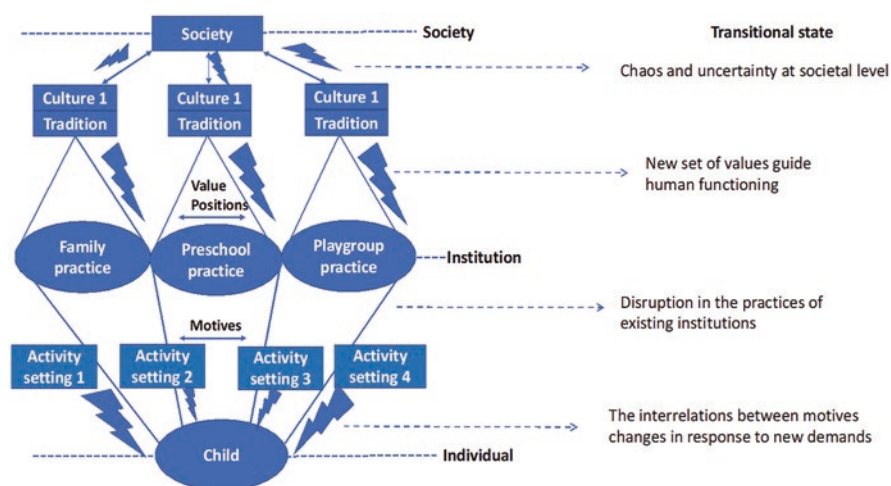


Fig. 12.1 Figure representing relations between society, cultural traditions, institutional practices, activity settings and children's activities and motives in the transitional state

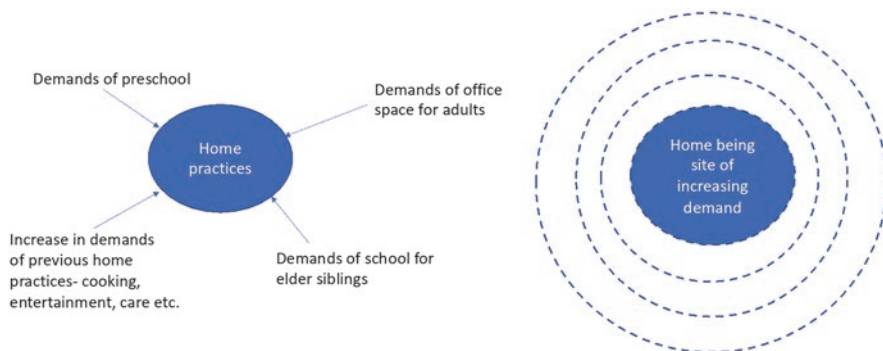


Fig. 12.2 Figure representing new demands presented in the home setting during the pandemic

The rules around physical distancing created new ways of digital interaction. It also made us rethink about the relationship between the biology, society and our cultural ways of functioning. The question of ‘body’ and its presence in the same activity setting or participating in children’s home setting from distance via digital demands further methodological nuancing. This is not to demolish the boundary of human or digital, observing through technology or being in the setting (self) but to challenge the binary categorisation of human and digital. We have argued elsewhere (Rai et al., 2022) that technology offers a transformative potential for children to explore and imagine collectively with their caregivers in a Conceptual PlayWorld.

From a theoretical perspective if we extend Hedegaard’s (2008) argument the nature of institutional demand and hence the practice itself changed dramatically. While responding to these new demands either transient or long-term new activity settings were co-created by children and caregivers. Hedegaard (2008) argues that setting is a “cultural-material conditions that take the form of city architecture, material characteristic of the institutions, room size, furniture, all sorts of material” (p. 15–16). She further explicates to understand the conditions for development, one must inquire: “What activity settings tend to dominate the institutional practices of modern society? What possibilities for activity are generated and how children act in these activity settings?” (Hedegaard, 2008, p. 17).

12.4 Digital Educational Experiment – Distal but Relationally Proximal

In educational settings one of the major responses of this crisis was use of digital tools to achieve our previous goals. Something that started as a ‘transient demand’, replacing previous demands of being present physically in the preschools or early learning centres. At Monash University’s PlayLab these challenges new demand influenced our role as a researcher working with families in their home settings and playgroups. The chapters in this section are reporting data from our efforts in working with families using digital technology. Drawing on the work in cultural-historical

tradition these chapters used educational experiment as a methodology for designing their research and analysing data (for further details on educational experiment see Chap. 2 in Sect. 2.1). Educational experiment as Hedegaard (2008) explains “is a multifaceted planned preparation of teaching which has, as its goal, the creation of optimal conditions for the learning and development of the participating children” (p. 185). The chapters presented in this section are interested in investigating how Conceptual PlayWorld could create new motivating conditions for children’s STEM concept formation in their home settings.

The design of educational experiment presented in these three chapters are in response to the emerging recurrent demands in the researcher’s social situation. One of the unique and common features of all the three chapters is that the researcher created a new “digital activity setting” using zoom in Chaps. 13 and 14 and using a new app for spatial thinking in Chap. 15. This new digital activity setting in the beginning was laden with researcher’s motive to learn more about children’s STEM concept formation but creation of collective imaginary situation using Conceptual PlayWorld pedagogic model created opportunities for families and children to bring their intentional projects and explorations to this new digital activity setting. Overtime engaging with children’s and families’ intentional projects and everyday practices developed a relational proximity between the researcher and the participant even though the researcher was a distal participant in these activity settings.

A positive picture is possible only if we radically change our representation of child development and take into account that it is a *complex* dialectical process that is characterized by *complex periodicity*, disproportion in the development of separate functions, metamorphoses or qualitative transformation of certain forms into others, a *complex merging* of the process of evolution and involution, a *complex crossing* of external and internal factors, a *complex process* of overcoming difficulties and adapting. (Vygotsky, 1997, p. 98–99)

The acknowledgement of complexity of researcher’s role (visible in Chap. 13 by Sonya Nedovic, complexity of family’s position as a co-researcher (in Chap. 14 by Suxiang Yu) and unpacking the complex narrative of designing digital games for teaching spatial concepts (evident in Chap. 15 by Ha Dang) shows an alignment of motives between the researcher and the researched persons. The researchers were also aware of their mutual relationship with the new digital activity setting which they created and fragile and transient nature of it in the times of crisis. The point was to consider the world in constant motion with mutual relations with other phenomena not as discrete cases. This interdependent and relational view of the world was central to these methodological innovations.

12.5 Creating New Motivating Conditions: Role of the Researcher

All the three chapters are focused on working with families and children in their home setting. The focus is on creating new motivating conditions for children’s STEM concept formation. *Instead of digital tool guiding the interaction, a theoretical formulation of practice guided by dialectical-interactive approach guided the*

practice in the digital activity setting. One of the prime focus was to create a collective imaginary situation. “Action in a situation that is not seen, but only conceived mentally in an imaginary field (i.e., an imaginary situation), teaches the child to guide his behavior not only by immediate perception of objects or by the situation immediately affecting him but also by the meaning of this situation” (Vygotsky, 1967, p. 11). There are three clear themes emerging in these chapters-.

12.5.1 Chapter 13: Family’s Positioning in Educational Experiment

Suxiang Yu has worked with families in supporting STEM concept formation for their infants and toddlers. In her research she used Flear’s Conceptual PlayWorld model to workshop with the families and developed a level of confidence in them to use characteristics of the Conceptual PlayWorld in creating their own PlayWorld. Unlike Chap. 15 where all the families participated in the same collective imaginary situation with the researcher over the zoom session in Chap. 13 families worked on the same book and same science concept but they worked in their home setting on their own and shared digitally recorded data with the researcher. One of the challenges for the researcher was to create an intersubjective space with families where they could understand her research motives. Characteristics of the Conceptual PlayWorld helped in mediating researcher’s intention of data collection and family’s expectation of working for their children’s learning in these digital educational experiments. The new digital setting created through collaboration was not only personally meaningful for the researcher but also for the families participating in the research.

12.5.2 Chapter 14: Developing Design Principle for Spatial Reasoning App

Ha Dang’s work in this chapter specially highlights the role of digital design in responding to the crisis by creating an app which offers freedom and new opportunities for families in supporting their children’s learning in the times of crisis. Using game as a site for concept formation using digital educational experiment methodology demands researchers to work at multiple planes but the most important of them all is to offer agency which could support parents in supporting their children’s concept formation. The researcher was working alongside families to better understand the nature of children’s engagement in these games.

12.5.3 *Chapter 15: Researcher's Positioning – Resolving the Dilemma Research Purpose and Pedagogical Purpose in the Educational Experiment*

The chapter led by Sonya Nedovic explicates that home setting is a multi-age setting with multiple adults. In the time of pandemic while preparing the design of intervention she was not thinking of one focus child but to engage the entire family. More importantly while working with families using digital tools meant she was moving between the role of researcher and teacher. On the one hand she was involved in developing a collective imaginary situation where she could explore characters of the story, problem situation and concepts with children (thus developing relational proximity), on the other, she was also observing and recording her experiences as researcher (distal observation of the home setting using zoom). She always had to be mindful of this thin line of being a researcher and partner with families in creating new conditions for their children's STEM learning. As Hedegaard (2008) argues "one has to conceptualise the projects of the researcher as different from the persons being researched and at the same time conceptualise the researcher as a partner in their activities." (Hedegaard, 2008, p. 44).

12.6 Conclusion

Meaningful motives are created when children experience new activity setting and gain competences when participating in new activity settings. The crisis created new opportunity where we as researchers became a distal participant in children's home setting but also developed a relational proximity in supporting their learning. It is worth noting that crisis creates critical moment of a dynamic, contradictory, developmental process (Dafermos, 2018, p. 2020) but it is not mere emergence of new demands which are negotiated by the families but a complex matrix of transient demands and challenges as represented in Figure 01 in the beginning of this chapter need to be negotiated. The chapters in this section highlight *collective response to uncertainty*. The participation in the collective creates opportunities for the development of individual consciousness which was made possible by digital tools in our research. This model can be represented as follows: "Collective activity-culture the ideal- sign or symbol-individual consciousness." (Davydov, 1998, p. 92–93)

Vygotsky's postulate of the major role of collective activity in the genesis of the individual subject brought him face to face with one important problem: the nature of the *ideal*. For traditional psychology, the ideal (if acknowledged at all) was situated in individual consciousness. Vygotsky, on the other hand, looked at the ideal in a completely different way. The ideal cannot be unraveled and understood at the level of individual consciousness; the ideal is an aspect of culture. Behind the ideal, behind the world of culture, and determining it, is practical activity with objects (above all labor) performed by the social subject in his historical development. (Davydov, 1998, p. 91–92).

Our quest following Hedegaard (2008) suggestion was to develop a wholistic approach to researching children's development in the time of crisis. The specific focus being on how can we as an early childhood education researcher formulate a methodology and undertake research where we focus on children's STEM concept formation, as related to their societal conditions, institutional practice and children's social situation?

Following Vygotsky (1987, 1997), Hedegaard (2008) and Davydov (1998) a dialectical approach was adopted that followed following three tenets:

- (a) children's STEM concept formation was examined as part of a developmental process from a wholistic perspective;
- (b) that change does not occur in a linear, evolutionary progression, but through qualitative transformations which in turn meant creating motivating conditions that offers opportunity for children's agency and imagination in their learning;
- (c) developing a comprehensive understanding of the material conditions that could offer opportunities for new learning for children and their families.

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Chapter 13

Digital Educational Experiments: Re-conceptualising Families' Roles as Competent Educators and Co-researchers for STEM Conceptual Development



Suxiang Yu, Prabhat Rai , and Marilyn Fleer 

Abstract Over the past few years, the COVID-19 Pandemic has posed new challenges, such as unexpected lockdowns and restricted research site visits to our educational experiments with families. These challenges demand that we develop innovative ways of working remotely with families using digital tools, leading to our development of digital educational experiments in family settings. In digital educational experiments, researchers no longer visit children's home settings, whereas families take up a more expansive role: they not only take up a pedagogic position for skilfully implementing the Conceptual PlayWorld [CPW] with infant-toddlers but also a co-researcher role for collecting meaningful digital data of CPW sessions for answering relevant research questions. It is not only essential to understand families' changing roles in digital educational experiments under the new research conditions but also necessary to understand how researchers can come up with a new study design that motivates and empowers families to take up the new educator and co-researcher roles successfully and thus generating high-quality research data for better understanding effective family STEM pedagogy and young children's STEM conceptual development. This chapter reports a CPW storytelling and mini-workshop study design for a digital educational experiment. It is argued that this new digital educational experiment design opens new possibilities for high-quality remote research with families.

Keywords Digital educational experiments · Families' roles in research · Conceptual PlayWorld · Motives and demands

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13.1 Introduction

Educational experiments have been theorised as an effective research method for studying young children's development from a cultural-historical perspective (Hedegaard, 2008). In an educational experiment, researchers intentionally transform "*practices in the problem area to bring out the central relations*" (Hedegaard, 2008, p. 182). This transformation of practices for more motivating conditions for children's development can only be done through authentic cooperation with educators in implementing pedagogical interventions (Hedegaard, 2008). In traditional educational experiments through site visits, it is vital for researchers and research participants to work together to formulate and revise the intervention by considering both the planned activities and children's actual activities (Hedegaard, 2008). However, in digital educational experiments, where researchers have limited access to the direct research site due to being physically remote, families, as the research participants, have to take up more responsibilities in implementing pedagogical interventions and data collection. In other words, in digital educational experiments, families must assume the role of competent educators for their children and the role of co-researchers. Existing literature shows the feasibility of training families to take up pedagogical roles such as teaching their children literacy or improving their children's behavioural issues at home through research interventions (Purcell-Gates et al., 2014) as well as the feasibility of positioning families as co-researchers to collect video data related to their children's development and their everyday practices at home even though there are some challenges and limitations (Aarsand, 2012). However, more needs to be known about the study design principles that support families to take up the pedagogic position as competent educators for implementing pedagogical intervention and the researching position as co-researchers for data collection, especially when the educational experiments must be conducted remotely and digitally, like the situations we have experienced during the COVID-19 pandemic. Through reporting a digital educational experiment design of a doctoral research project conducted during the COVID-19 pandemic, this chapter aims to share some experiences regarding how a storytelling and mini-workshop design empowered families to successfully take up the roles of educators and co-researchers in the digital educational experiment. It starts with a brief discussion of guiding principles for the digital educational experiment design, followed by the study design, then data examples to show the outcome of the study design, which is then culminated with a brief conclusion.

13.2 Two Guiding Principles for the Digital Educational Experiment Design

13.2.1 Pedagogic Design: Mini-workshops and Storytelling Sessions

The quality of the research data generated in educational experiments significantly depends upon the intervention implementers' pedagogical understandings and practices (Hedegaard, 2008). When the educational experiment is conducted in family settings, either the researcher needs to have the ability to implement systematic intervention and transform children's social situation of development in the digital activity settings created (Nedovic, Chap. 15, [this volume](#)), or they need to support participating families to develop the motives and competence as competent educators to implement Conceptual PlayWorld (CPW) intervention in their family settings systematically. The second approach is adopted in the design of this particular digital educational experiment. Therefore, pedagogic design thinking must be applied to the study's design (Rai, Chap. 12, [this volume](#)). In other words, researchers' interactions with families need to support families in enhancing their understanding and competence in independently implementing CPW sessions at home. Due to the busyness of modern family life, mini-workshops and storytelling designs are applied to engage and motivate families in digital educational experiments. Details of the design will be explained in the next section. For a more expansive reading on how educational experiment model has been used to work with families read (Rai & Flear, [under review](#)).

13.2.2 Collective Digital Activity Settings: Mutual Alignment in Motives

Authentic collaboration occurs when the researcher and families have a mutual alignment of motives. The researcher needs to ensure the study design allows the researcher and families to communicate and negotiate their motives for participating in the research activities, the demands they place upon each other to achieve their objects of the research activities, and their efforts to meet each other's demands. Therefore, another principle underpinning the study's design is to maximise opportunities for clear mutual communication of expectations and demands as well as making the best effort to meet each other's demands. The following study design section explains strategies for creating mutual alignment in motives.

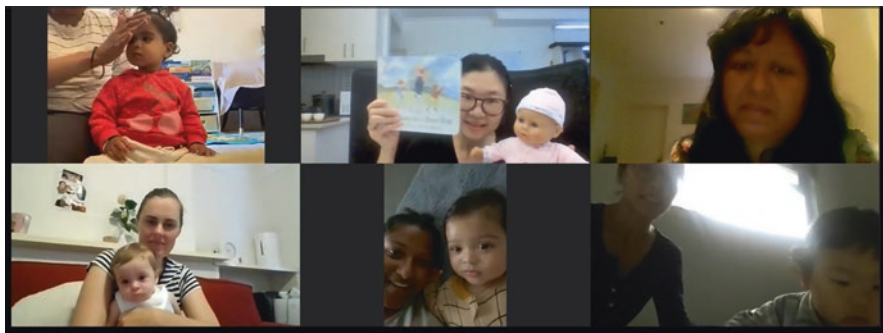
13.3 Study Design and Implementation

The purpose of this educational experiment is to explore the implementation of the five characteristics of the CPW model to allow for “*an evolving theoretical understanding and for the creation of new and better practice conditions for*” infants and toddlers’ STEM development in family settings (Hedegaard, 2008, p. 182). The data were collected in two research rounds: one in March and one in July 2021, with nine families in each round. For each round, three sets of timeslots were offered for families to choose according to their convenience. Therefore, the number of families in each group varied, generally around two to five. The chosen storybook for this Conceptual PlayWorld is “*We Are Going on a Bear Hunt*” by Michael Rosen.

The digital educational experiment starts with a pre-CPW semi-structured interview with each family, which allows the researcher to learn about the families’ current institutional practices and their motives for participating in the research activities. The researcher communicates to the families about their role as educators and co-researchers in the digital educational experiment, for they are expected to implement the pedagogical characteristics of CPW and to collect video observations, which will be shared and discussed in the mini-workshops. The researcher also explains to the families regarding the research aim, the research design, and their rights to withdraw from the research at any time without any reason. Thus, families are aware of their multiple roles in the digital educational experiment as research participants, educators, parents, and co-researchers. Families are also encouraged to share with the researcher regarding what support might benefit them during the study process.

After the pre-CPW interview, each group has ten half-hour storytelling and mini-workshop sessions, two sessions each week for five weeks. Each half-hour storytelling and mini-workshop session includes the following activities:

- Greeting rituals (singing a hello song and making an acknowledgement of the country)
- The researcher tells the story with the support of props, such as dolls, teddy bears, and virtual pictures, hoping that the storytelling creates a motive orientation for infants and toddlers to become interested in the *We Are Going on a Bear Hunt* story imaginary play.



- In the mini-workshop presentation in each session, one or two pedagogical characteristics of the CPW are introduced alongside the recommendation of concrete play ideas and the sharing of implementation examples from families. Families are encouraged to share and discuss their confusions, challenges, learnings, and new plans for implementing CPW at home in small groups. Supported by the collective practice space created in digital activity settings of Zoom mini-workshops, when one family in the community gains a new play idea or learning of CPW, other families benefit from the new idea and learning, enabling the collective advancement of theoretical and practical understanding of the implementation of CPW for infants and toddlers in family settings. The researcher also openly shares her nervousness and uncertainty as a beginner doctoral researcher conducting the research and encouraging families to share their emotional experiences, either positive or negative, related to the implementation of CPW during the sessions or in emails between sessions. The ten mini-workshops are each planned with a digestible amount of information for families yet gradually support families to understand and implement CPW systematically at home. The actual plan and implementation of the mini-workshop are shaped and guided by families' changing demands. Emails summarising the key points of the zoom session alongside mini-workshop presentation slides are sent to families after each session so that even if they occasionally miss sessions, they can catch up by reading the emails. The following is a plan of the ten workshops with the demands that families and researchers place upon each other.
- Goodbye rituals (singing goodbye songs and reminding time for the next meeting)

Mini-workshop number	Mini-workshop focus	Demands the researcher placed on families	Demands families placed on researcher
1	Creating imaginary spaces at our home	Families were expected to create <i>we are going on a bear hunt</i> imaginary spaces at home	Families expected to see examples of how these imaginary spaces could be created, so the researcher also created imaginary spaces at home for her imaginary daughter
2	Enriching interactions within imaginary spaces (video clips such as 'talking about temperature [hot, warm, cold] during feeding time' and 'using the concept of temperature to enrich interactions in the snowstorm space' recorded by the researcher with her imaginary daughter were shared with families)	Families were encouraged to share videos of their interactions with their infants and toddlers in the imaginary spaces created.	Families reported the challenges of recording digital videos at home alone. The researcher created a design for a reusable self-made phone camera holder using easily accessible everyday recycled materials in home settings and shared the design with families.
3	Creating play inquiry or problem scenarios in the CPW (examples of <i>we are going on a bear hunt</i> problem scenarios such as 'how can we find a bear'? 'Oh, no, shoes stuck in the freezingly cold snow', or 'we do not want to go through the water, it is too cold, how can we go across the river?' Were provided by the researcher)	Families were encouraged to develop their problem scenarios and solutions for <i>we are going on a bear hunt</i> CPW. [see one example in the data example section]	The researcher explained the concept of problem scenarios and provided a few examples of problem scenarios.
4	Offering digital resources (such as printable bear paw prints and a digital picture book about bears) to support the creation of the problem scenario of 'how can we find a bear' which is the central problem scenario innate in the <i>we are going on a bear hunt</i> storybook	Families continued to be encouraged to share ideas and videos of problem scenarios they created.	Some families experienced challenges in not having enough resources, and the researcher responded to this demand by creating and sharing digital resources.

(continued)

Mini-workshop number	Mini-workshop focus	Demands the researcher placed on families	Demands families placed on researcher
5	Some clarifications for CPW (based upon questions asked by families such as 'how long CPW session should last?', 'What to teach in CPW?', 'Whether it is important to keep the imaginary spaces there but what happens if we do not have enough room at home?')	Families were encouraged to reflect and share their experiences implementing CPW.	Families shared further challenges and confusion they experienced while implementing CPW. The researchers offered further conceptual tools such as 'adults' pedagogical positions' and the idea of 'pop-up CPW.'
6	STEM concepts in everyday life (a list of potential STEM concepts in our everyday experiences were introduced)	Families were expected to reflect upon the opportunities for teaching STEM concepts in their everyday lives and CPW.	The researcher did some research and compiled a list of STEM concepts families might experience daily.
7	Families were encouraged to be more conscious of the STEM teaching opportunities in our everyday life and CPW.	Families were encouraged to explore further regarding how to use STEM concepts to enrich interactions in imaginary spaces and to create problem scenarios that require the use of the concept for problem-solving.	The researcher shared examples of STEM concept teaching ideas she learned from various families.
8	Sharing digital resources with families, such as songs, stories, STEM concepts, play objects, and activity ideas, which they could use to enrich their interactions in CPW. Concepts of teaching strategies were introduced to families.	Families were encouraged to implement CPW at home and further plan how they might be able to continue to enrich their interactions in the CPW. They were also encouraged to become more conscious about their pedagogical positions and strategies.	Based on each child's and family's STEM exploration interests, the researcher researched and shared more digital resources with the families. Pedagogical strategies observed in their interactions, such as 'observing, acknowledging, modelling, and co-constructing', were made conscious to families.
9	Sharing useful websites, explaining how to identify a need for a particular resource and idea, and searching resources on the internet.	Families were encouraged to enrich their play by searching for new resources and ideas.	The researcher drew upon her previous experience as an experienced early childhood teacher, and she shared with families how to search for new digital resources and play and teaching ideas on the internet.

(continued)

Mini-workshop number	Mini-workshop focus	Demands the researcher placed on families	Demands families placed on researcher
10	Reviewing all five characteristics of CPW again	Families were encouraged to continue the <i>we are going on a bear hunt</i> CPW and plan and design a new CPW based upon a new storybook after the CPW intervention.	The researcher shared digital resources such as ‘conceptual PlayWorld planning hints’ and ‘CPW starters for families template’ with families.

13.4 Data Showcasing the Effectiveness of the Study Design

13.4.1 Families as Motivated Co-researchers

When families’ motives are understood, and their demands met, families are more motivated to stay in the study. The following is a summary of the participation and the data collected by each family in the study. In sum, families collected around 5.5 hours of high-quality home-recorded video data.

March round 2021

	Age of child at the start of CPW	Story-session participation	Home-recorded data	Pre Interview	Post Interview	Recorded data sum
Family 1	6 months	10/10= 5 hours	35mins 57 secs	17mins44secs	14mins5secs	6hrs7mins
Family 2	8 months	9/10=4.5 hours	68mins 19 secs	26mins	20mins24secs	6hrs24mins
Family 3	12 months	9/10=4.5 hours	24mins 07 secs	17mins10secs	27mins35secs	5hrs38mins
Family 4	10 months	7/10=3.5 hours	55mins 29 secs	20mins 48secs	37mins16secs	5hrs23mins
Family 5	8 months	7/10=3.5 hours	39mins 40 secs	7mins33secs	22mins25secs	4hrs39mins
Family 6	4 months	7/10=3.5 hours	18mins 28 secs	13mins31secs	15mins35secs	4hrs17mins
Family 7	13 months	6/10=3 hours	33mins 25 secs	18mins19secs	0	3hrs51mins
Family 8	7 months	6/10=3 hours	2mins 51 secs	19mins13secs	13mins39secs	3hrs35mins
Family 9	10 months (4 years 7months sister)	5/10=2.5 hours	8mins 38 secs	25mins34secs	29mins50secs	3hrs33mins

July round 2021

	Age of child at the start of CPW	Story-session participation	Home-recorded data	Pre Interview	Post Interview	Recorded data sum
Family 1	10 months	10/10=5 hours	14mins55secs	19mins27secs	28mins 17secs	6hrs27mins
Family 2	7 months	10/10=5 hours	7mins 40secs	16mins2secs	14mins	5hrs37mins
Family 3	13 months	9/10=4.5 hours	1min16secs	21mins39secs	17mins7secs	5hrs9mins
Family 4	4 months (Brother 2years 9months)	9/10=4.5 hours	10mins6secs	26mins28secs	25mins 37secs	5hrs32mins
Family 5	21 months (sister 5years 2months)	9/10=4 hours	2mins33secs	22mins30secs	19mins29secs	4hrs44mins
Family 6	10 months	7/10=3 hours	0	21mins24secs	16mins	3hrs37mins
Family 7	13 months	6/10=2 hours	0	17mins2secs	12mins 46secs	2hrs29mins
Family 8	24 months (Brother 4years 3months)	5/10=2 hours	0	22mins39secs	35mins51secs	2hrs58mins
Family 9	6 months	4/10=1.5 hours	4mins42secs	14mins56secs	18mins40secs	2hrs8mins

13.4.2 Families as Competent Educators

After mini workshop 3, one family came up with a problem scenario about getting across the muddy area without getting dirty. Their creative solution for this problem was to create stepping stones (they pretended onions as stones), and they introduced mathematical concepts such as counting how many stepping stones they needed to get across the muddy area (see Image 13.1: counting; Image 13.2: Going across the mud through stepping stones). Before the zoom session, the family also asked the researcher about this play idea, and the researcher responded to her in an email with an encouragement. Then, after the researcher received the video recording of this interaction, the researcher commented in the email response, trying to further motivate the family by making some positive comments alongside the researcher's common-sense interpretation of the video data. The original email response commented on three videos that the family had shared that day, and the following excerpt focuses on the particular "getting across the muddy area" video:

Your problem scenario of going through the mud in the imaginary world is so creative! It's sooo amazing! And I absolutely love it when you intentionally teach mathematical concepts such as counting stepping stones! I can see how engaged Jay (pseudonym) was. He listened to you counting the 'stepping stones' so attentively! And he was so excited about the mud, and he explored the mud through his senses, such as touch, taste. I love watching your interactions with Jay. (2nd April 2021 email)

Another example is an email from a family participating in the CPW educational experiment in July 2021. The family took the initiative to reach out to me and told me that they had continued applying the pedagogical characteristics they acquired from the CPW mini-workshops after the data collection. The following is a short quote from the family's email sent to us two years after the data collection:

I'd like to think that both kids have somewhat excelled in their learning by using this skill to become more immersive and unlock their imagination (which seems to make the memo-

Image 13.1 Counting

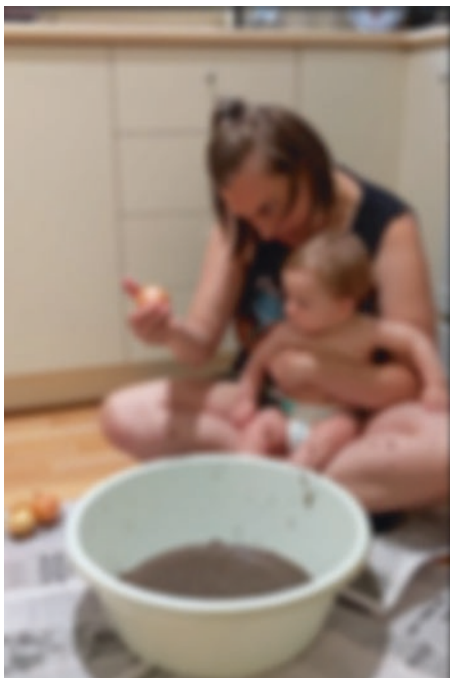


Image 13.2 Going across the mud through stepping stones



ries richer and deeper). I also think that as a parent, it has helped me to learn about how to play with them in a more engaging way and become more 'present' with them when we play. So, the program has dual benefits in our instance. (25th April 2023 email)

13.5 Conclusion

This digital educational experiment shows that families have the competence and motive to take up diverse roles in digital educational experiment as research participants, parents, educators, and sometimes also act as co-researchers. The mini-workshops with families create new demands and offered conditions for families to try their innovative ideas in their family settings. The collaborative design of the educational experiment supports mutual alignment of motives between the researcher and families thus building a common knowledge (Edwards, 2011; Rai, 2019) to support responsive pedagogic action. It is argued that the mini-workshop and collaborative design of Conceptual PlayWorld supported digital educational experiment design and empowered families to assume the diverse roles in digital educational experiments.

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Chapter 14

Digital Spatial Game Development and Practice Analysis in the Home Setting



Ha Dang, Prabhat Rai , Marilyn Fleer , and Jonathan Li

Abstract Drawing on Conceptual PlayWorld characteristics (Fleer M., *Early Years* 39(1):1–22, 2018, 2018), this research focused on designing digital games to support children’s spatial development in the home setting. During the time of pandemic these specially designed digital games created a new activity setting in the children’s everyday home practice and offered a new, amplified digital spatial learning opportunity for the children. The narrative from the children’s story book, collective participation of children and parents and awareness of the adults to create conceptual learning opportunities for children made participation of children in these games personally meaningful for them. While playing these games, the children’s dominant motive for play were employed as a stimulating motive for learning spatial concepts. The chapter unpacks some of the design principles that guided development of these digital spatial games.

Keywords Digital games · Augmented reality · App design · Conceptual PlayWorld · Cultural-historical methodology

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14.1 Introduction

This chapter draws on the doctoral research of the first author that uses educational experimental intervention into everyday family practice to create motivating conditions for children's spatial development in the home settings. Spatial reasoning skills, the ability to mentally visualise and transform objects, are crucial for participation and success in Science, Technology, Engineering, and Mathematics (Wai et al., 2009). Spatial skills are not innate, but malleable with input and practice across all ages (Uttal et al., 2013). Longstanding research suggest that adults can help support children develop spatial skills by using spatial language, gesturing, playing with blocks, puzzles and shapes (Verdine et al., 2014), reading spatial books, or working with maps (Newcombe & Frick, 2010). However, despite an increasing interest in understanding spatial learning in young children, research into the role of digital play in children's spatial development are very limited (Polinsky et al., 2021).

Many young children are comfortable using mobile devices such as smartphones and tablets for both educational and entertainment purposes (Rideout & Robb, 2020; Barr, 2019; Flynn et al., 2019; Lieberman et al., 2009). Mindfully used, digital technology can offer learning affordances for children through everyday practices (Barr, 2019; Gee et al., 2018) and can extend learning affordances through play for young children beyond, and complementary to, traditional toys (Stephen, 2015; Lieberman et al., 2009; Cascales et al., 2013).

In times of pandemic with strict physical distancing rules, children's access to learning in early years became very restricted. This research offers a set of design principles guided by pedagogical thinking supported by Conceptual PlayWorld that supports children's learning in home settings. We offer evidence that shows digital games can create new motivational conditions for spatial thinking and concept learning in the home setting.

In designing and building three spatial games to be used in a family educational experiment, we aim to create new developmental conditions and introduce amplified and complementary spatial learning opportunities through digital materials. This chapter will present both the approach to developing the games and to engaging with families while using them to help create motivating conditions for children's spatial development in the home. A sample slice of data detailing family interactions as children play on one of the apps is presented as an illustrative example.

14.2 Digital Tools and Children's Conceptual Thinking in Early Years

Well-designed games can help children develop abstract thinking and foster positive learning habits, such as persistence and creativity (Lai et al., 2018; Verenikina et al., 2010; Stephen, 2015; Lieberman et al., 2009). Games have been shown to

support social and emotional skills (Zhao & Linaza-Iglesias, 2015) and academic areas such as literacy and STEM thinking (Meyer, 2013; Ormsby et al., 2011). Lowrie and Jorgensen (2015) suggest that “gaming may well be the next major influence on learning and education” (p. 2). Cultural-historical perspective calls for studying children’s development in the everyday settings, where relevant and familiar cultural tools are used by both participants and researchers (Hedegaard & Fler, 2008). In our larger study, we are investigating how different types of resources help provide spatial learning affordances for children in the home. It makes sense that digital resources, such as mobile game apps, are included, in addition to concrete resources such as picture books and physical games. Digital technology can complement and amplify traditional learning experiences, or make possible spatial learning experiences through play for children that may not otherwise be available.

14.3 Design of the Study

From the researcher’s perspective, our role in executing this family educational experiment consists of two stages. The first stage is related to *theoretical development*, which involves understanding pathways for children’s spatial reasoning development in terms of the different spatial reasoning skills and activities and experiences to support spatial learning. Additionally, fundamental characteristics in designing resources that can engage young children must be considered. The second stage is about *practice development*, which involves engaging with the family to investigate how they participate in spatial tasks and spatial thinking. We need to work with families to introduce the new spatial resources to them and see how they use the provided resources to create new conditions for spatial development in their homes.

14.4 Theoretical Foundation of the Game Design

Our game design approach was guided by the Conceptual PlayWorld (Fler, 2018) pedagogical intervention model involving storytelling, spatial reasoning literature, and games literature on how to engage young children as well as what they are capable of doing using their fine motor skills.

In Conceptual PlayWorlds, adults and children collectively enter an imaginary situation, overcome challenges to help the characters, and learn concepts in the service of play. Adults take on a central role to help sustain the play. In our games, we tried to borrow from the Conceptual PlayWorld’s characteristics of storytelling, emotional engagement, and problem solving as part of play. Adults are invited to provide instructions and help children through the games to sustain their engagement and support their learning. In doing so, the adults also become more conscious of spatial concepts, and perhaps influence other family practices to support spatial learning.

Children who hear more spatial language tend to have better spatial reasoning skills (Pruden et al., 2011; Verdine et al., 2014). In our apps, we chose books containing many spatial words, such as the prepositional words, ‘over’, and ‘under’, in *Rosie’s Walk* (Hutchins, 2015), and chose puzzles with many different shapes. We also included different types of shapes, as well as types of particular shapes such as triangles (right-angled, isosceles) to draw attention to what properties define a triangle (Newcombe & Frick, 2010). Spatial transformations, such as mental rotation and translation, are important spatial reasoning skills (Levine et al., 1999; Verdine et al., 2014), the puzzles in *Fun Shapes*, *Winter Quilt* and *3 Little Pigs* provide opportunities to practice them. Through both puzzle design and explicit instructions, we encourage families to use prepositional words, words relating to dimensions and shapes, such as ‘big’, ‘long’, and ‘triangle’, and words describing spatial transformation, such as ‘turn’ or ‘rotate’.

A very important consideration for children’s digital play is social interactions (Barr, 2019; Yelland, 2005; Stephen et al., 2008), and this is what we advocate for in our research methodology. The apps by themselves are not enough. We ask parents to sit with their children while they are playing and give them hints and help as needed, using spatial terms such as ‘turn’, ‘on top of’, ‘big’, ‘triangle’. This can be seen in the data presented in the later part of the chapter.

A number of other features of games environment to help children stay engaged (Lieberman et al., 2009) that we also drew on include instructions, repetition and progression of increasing difficulty through different levels, and encouragement and help through visual and verbal feedback. We have also chosen contents that are familiar to the children, such as farm animals, as well as the use of bright colours and cheerful background music. Last but not least, because of young children’s developing fine motor skills and therefore differing abilities to use different gestures for touch screens (Nacher et al., 2015; Aziz et al., 2014; Lanna & Oro, 2019), we needed to build the apps such that young children could interact with them effectively. While tapping is easily done by most preschool aged children, drag and drop is a little more difficult for two-year-olds, and rotation is difficult for three-year-olds and under (Nacher et al., 2015; Aziz et al., 2014), although Nacher et al. (2015) found that the children could perform these gestures after receiving help from adults. Therefore, we designed the games such that single tap gesture is all that is required to play *Rosie* and *Winter Quilt*, single tap gesture and single-finger drag-and-drop for *3 Little Pigs*, while *Fun Shapes* involves more advanced gestures such as single-finger drag-and-drop, and two-finger rotation.

The first author is part of both Monash Engineering and Monash Conceptual Playlab, so a partnership was created with Monash Engineering final year undergraduate students. The researchers provided the game ideas, puzzle banks and feedback, and coding was done by the students as part of their Engineering final year project. The students were given artistic freedoms to design their games.

14.5 Practice Developing Research Approach

Once the games have been developed, the next step is encouraging families to use them for creating a new digital activity setting in their home setting which offers new motivating conditions for spatial concept learning.

14.5.1 Instruction and Information for Parents

To make it easy for families, all but one game was pre-installed on a 10-inch touch screen Android tablet, which was provided to each participating family. Each game comes with a set of instructions on how to play. In addition, information about spatial reasoning skills and how playing with each of the game can help develop children's spatial skills was also provided as a menu item in each game. The tablet was provided to the families as part of a package of spatial resources that also contained children's picture books with spatial content and physical resources that the researchers developed or curated.

14.5.2 Interaction with Families During Observation Sessions

For in-person home visits, two researchers were present, each holding a digital video camera. The first researcher's primary purpose was to interact with and observe the family, while the second researcher's primary purpose was to record clear visual and audio footage to be used for data analysis. The first researcher's camera recording was used only as a backup, in case the other camera failed. For sessions over Zoom, only one researcher was present to interact with and observe the family, with the session recorded using Zoom's recording function. Prior to the first session, the researcher would meet with the family over Zoom to set up the foundations of educational experiment and develop collaboration with families.

Each session was loosely structured and the researcher's positioning varying between an active participant and an active observer. At the start of each session, the researcher always chatted to the children about their interests and what was happening in their lives, as well as follow up on anything special that was mentioned at a previous session. Activities were sometimes initiated by the researcher, and other times by the children or the parent. Children were encouraged and allowed to play the games for as long as they stayed enthusiastic. The researcher and parents worked closely together to change activities once the child(ren) lost interest or became tired. For each of the games, the researcher provided quick instructions on how to play and then generally observed and let parents guide the play; sometimes the researcher

interjected to ask questions e.g. ‘Why can’t you see the cow’s tail in a front on view?’, offer hints and tips, or praise the children. Each session was nominally 90 minutes in length, but was sometimes ended early if we sensed that the children were tired or hungry, or we would go for longer, if there was a lot of interest and momentum.

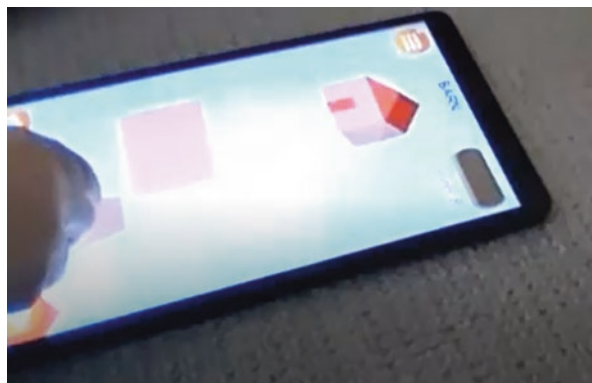
14.6 Data from Video Observation

This vignette recorded with Ivy (almost 7) and Adam (just turned 4) are playing the game *Fun Shapes* with Mum. This segment of data is from the last of the four observation sessions with the family over Zoom. The utterances are colour-coded for ease of reading, and spatial words and actions are bolded to highlight when spatial language or action is used during game play. Children and mother are in Farm World and are now up to a picture of a barn and it is Adam’s turn. A pink square, the anchor shape has been put in place by the game setting to start off (Fig. 14.1).

Adam has picked up a trapezium, which forms part of the side of the barn, and it seems he is thinking about where to put it. Ivy helps by pointing to the right side of the square and says, “Maybe it might go **around** there... yeah it goes **around** there.” Adam moves the shape to that space. Mum tells him, “It might need to be **twisted** a bit.” Ivy puts her hands on the shape to help Adam **rotate** it, then tells him to “drag it **down**”. The shape has not been rotated to the right orientation and does not snap into place. Mum then points to the picture at the top and asks, “look at this one, which **side** is the **longer side**?” Upon hearing that, Ivy **rotates** the trapezium a bit more, and mum tells her, “try **twisting** it a bit more, that **side** is not the right **length**, is it?” Ivy **rotates** it some more and the shape now snaps into the correct position.

Mum asks Adam, “now where does that pink **triangle** go?” He accidentally picks up the big red rectangle instead, so Ivy chuckles and tells Adam to “take that one **down**”. He says, “no, it’s a door”, to which Ivy replies, “no, it’s too **big** for a door”. Mum agrees with Ivy and asks him, “What’s that colour?”, and Adam says “red”.

Fig. 14.1 Ivy (almost 7) and Adam (4) putting together geometric shapes to make a barn, in *Fun Shapes*, with mum’s help



The door is more of a dark pink, rather than red. Ivy **points** to the side of the roof in the model picture and says, “So it goes **up** here”, then she uses her finger to **trace** a triangle on the space above the big pink square and repeats, “**up** here”. Adam protests, “That’s the right **side** though.” Ivy reaches over and start **rotating** the red rectangle so it matches the one in the model picture at the top and says, “Put it **up** here. Put it **up** here.” Adam is still not convinced. Mum intervenes and tells them, “it would be difficult to put it there until you put that **triangle** there first.” So Adam drops the rectangle back down and Ivy drags the pink triangle up to its position.

Ivy then uses her finger to **trace** a rotated rectangle in the space to the right of the triangle, saying “that one goes here”. Adam drags the rectangle up and starts **rotating** the shape. Ivy says “maybe you have to **turn** it a little bit”, and starts to try to help him, but he has **rotated** the shape to correct to right orientation and it snaps into place. Mum says triumphantly, “Got it!”

Adam now put the little triangle in, saying “**Turn** it” as he does so. Ivy tells him he doesn’t need to turn it. Adam gets it in, nevertheless. Finally, he puts the little rectangle in where the door goes, while Ivy sings a tune.

14.7 Discussion

Hedegaard (2002) defines *motives* as “the goals that come to characterise a person’s actions in different activities over a longer period of time” (p. 55) and describes three types of motives—dominant, meaning-giving, and stimulating motives. Motives are historically and culturally developed throughout a person’s life. Children acquire motives and competencies through cultural interactions with adults and more competent peers within social institutions, such as the home, the community, or school, and how they respond in those interactions (Hedegaard & Chaiklin, 2005).

Children’s development can be conceptualised as changes in their *dominant motives*—the most important motives that outweigh other motives, and are associated with key activities in their lives. For example, the preschool child’s dominant motive may be play, and the young school child’s dominant motive may be learning. This dominant motive influences how a child may orient themselves in different activity settings (Hedegaard & Chaiklin, 2005). The dominant motive is a *meaning-giving motive*, however, when a child participates in an activity, they may have a number of other meaning-giving motives. It is a child’s changing hierarchical organisation of their motives that reflects their individuality and development over time. An activity becomes *motivating* “if it relates to a person’s motives” (Hedegaard & Chaiklin, 2005, p. 64). A dominant motive can be drawn on as a *stimulating motive* for activities which may not initially be motivating (Hedegaard, 2002), resulting in them becoming personally meaningful and motivating. Everyday family practices and moments can be appropriated into stimulating motive, therefore a motive orientation for spatial learning can start at home under motivating conditions.

For the children in the vignette, play is their central activity at home and their dominant motive. When introducing them to the app, meaning making is achieved by including stories and having the play materials both novel and within the children's interests. Playing an app on a tablet is quite novel for these children as their family practices do not include a lot of screen time. They are, however, familiar with animals, and they relate well to farm things, to reading picture books, to the concept of keeping warm when it is cold. When the parents and the children use the apps, they create quite playful conditions for themselves. The children help each other and take turns with the puzzles, with the mother sitting with them and being actively involved, asking questions and making suggestions. The children enjoy the apps and engage with the pictures and they feel happy when they complete a puzzle and they keep going through puzzle after puzzle. The act of completing the puzzles necessitates the use of a lot of spatial language. Collectively, the families become more conscious of spatial language and concepts. *Playing with the apps help make more concrete the spatial concepts of rotation, size, shape and preposition.* The app helped to amplify and complement picture books and other physical resources, providing motivating conditions and contribute to children developing a motive orientation for spatial learning in the home.

14.8 Conclusion

The digital apps we built during the pandemic are simple and have plenty of room for improvement but they show clear direction in terms of capacity these new digital tools offer us to work with families. However, the methodological point worth highlighting is that the families became part of these developments as they were considered collaborator in developing a new pedagogic space for their children's spatial thinking capacities. The technical innovations supported by Monash Engineering Faculty were brought together alongside the design of Conceptual PlayWorld to create a new spatial learning opportunity that was fun and engaging for children. Central to this design was the effort to amplify children's play. Even though these games can be played solo but our effort was to engage the family so that adults have an opportunity to extend and offer new pedagogical insight to children. During each play session, a lot of social interactions occurred especially around the solving the problem that demanded use of spatial language. As discussed in the previous section the families become collectively more aware and conscious of the spatial concepts of rotation, preposition, dimensions, and shapes. Thus, the digital apps we created seem to create new developmental conditions for spatial learning in the home setting. They complement and amplify concrete materials, and could potentially be used in place of concrete materials where they are not available, hard to access, or too costly. This we imagine would help to narrow the gap between well-resourced and under-resourced families. Educational technology is constantly evolving, with

digital tools allowing families create new possibilities for their children, and so research methodologies and materials should also evolve. These apps helped in building common knowledge (Edwards, 2011; Rai, 2019) that was used by the researcher to develop a relational proximity with the families who were finding it difficult to support their children's learning during the pandemic.

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Appendix

Description of the Digital Games

Rosie

Rosie's Walk, by Pat Hutchins (2015) is a picture book about Rosie the hen who walks around her farm, oblivious to a stalking fox, who unfortunately gets into all sorts of mishap. *Rosie* the app is an Augmented Reality app to help illustrate prepositional words. When the player hovers the mobile device over specific pages of the book containing a prepositional word, such as 'under' or 'over', a 3D animation of the page is rendered on the screen. When the player taps the "Play" button on the screen, Rosie will perform the action as per the text, such as walking "across the yard". An audible (and optional) narration reads out the text. This game makes prepositional words more visible and connected to everyday experiences, amplifying children's engagement with the text and reading experience (Fig. 14.2).

Winter Quilt

Winter Quilt is an app to help develop mental rotation and translation of 2D. It is inspired by the Thurstone test mentioned in Levine et al. (1999). In *Winter Quilt*, we tell children the story of forest creatures who are cold because winter has come early, and asked to help keep forest creatures warm by making them a quilt by finding two shapes that would join to make a square. Each completed square is added to the quilt; the more squares, the bigger the quilt. Children can choose an animal that they would like to make the quilt for, from a selection of six. At the end of each level, a picture of how the squares have been put together so far is shown on the animal so children can see their progress on the quilt (Fig. 14.3).

Fig. 14.2 Ian (5) trying out the *Rosie* app



Fig. 14.3 Adam (4) selecting the shape that would fit in the hole, in *Winter Quilt*, with mum



Fun Shapes

Fun Shapes is an app to help develop mental rotation and understanding of shapes, and spatial relations. By selecting 'Farm World', children are presented with a series of figures of common farm objects, such as a tree, a cow, a tractor, or a farmhouse, of varying difficulties, to construct using geometric shapes. By selecting 'Mouse Shapes', children can also construct pictures from the *Mouse Shapes* book by Walsh (2001). We introduced the physical book to the children, followed by the game using physical coloured cardboard pieces, before showing them the app (Fig. 14.4).

Fig. 14.4 Rose (3), playing *Fun Shapes*, with Ian (5), Henry (7), and mum



Fig. 14.5 Rose (4), playing *3 Little Pigs* with mum



3 Little Pigs

3 Little Pigs is an app to help develop mental rotation, loosely based on the story about the three little pigs. Children are told the story about mending the fence around the pig's house to keep the wolf out and are presented with a series of walls with gaps of different sizes, which they need to fill using Tetris-style shapes. We introduced the physical book to the children, followed by the game using physical 3D blocks, before showing them the app (Fig. 14.5).

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Chapter 15

Researcher's Positioning in a Digital Educational Experiment: Conceptual PlayWorlds in the Home Setting



Sonya Nedovic, Prabhat Rai , and Marilyn Fleer 

Abstract In an overarching capacity, our research sought to investigate how families create conditions for children's STEM learning in home settings. However, a methodological crisis formed when COVID-19 social distancing protocols contradicted our use of an educational experiment. Traditionally, an intervention into everyday practice such as this requires the researcher to enter the family home and participate in the child's experience before interpreting how the child is developing through their relational interactions with others. This chapter reports on how the researcher positioned themselves in response to these methodological demands and created a new kind of activity setting fruitful for conceptual development through the use of digital tools. Our methodological approach can be adapted by future researchers to guide interactions and collaborations with families in the digital space.

Keywords Collective imagination · Leading activity · Educational experiment · Researcher positioning · Motives and demands

15.1 Introduction

The aim of this chapter is to conceptualise researcher's positioning within a multi-age digital educational experiment across four family settings. The cultural historical theory informed our development of a methodology which used digital tools within a Conceptual PlayWorld intervention (Fleer, 2017) to create motivating conditions for collective family participation in STEM learning.

There is limited methodological work detailing the design and implementation of educational experiments, and we know even less about how this type of research

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translates to a digital space. COVID-19 created a crisis for researchers working with families to support children's learning in early years. Physical distancing norms, which have persisted across the timespan of several years, continue to create a methodological crisis, affecting the ability of researchers to collect data capturing children's interactions across various institutions. Zoom and other similar online tools replaced face-to-face interaction. Continuing research in these new societal demands requires reflexive clarity about the role of the researcher. The methodological framework presented in this chapter provides new opportunities of data collection and continued support to families.

15.2 The Researcher's Role in Creating a New Activity Setting

As described by Prabhat Rai and others in Chap. 12, our use of Hedegaard's (2008c) holistic approach for understanding children's development meant that we considered the child's individual activity as a dialect with the institutional practice of their various family activity settings, one of which was the digital setting which the researcher created with them. According to Hedegaard (2023), it is not possible for a researcher to access a child's first perspective, rather, it is only possible to grasp a relational perspective which identifies the interaction between the child and the adults who mediate their activity settings. This is because a child develops through relationships with others, and therefore should not be viewed as an object of study. In this *double perspective* (Hedegaard, 2023), where the focus is on analysing child-adult intersubjectivity, researchers are able to count themselves as a significant adult in the activity setting and interpret how their contributions mediate the child's intentional orientation. Later in this chapter we describe how the researcher framed her participation in the digital activity setting as a *dual social role* (Hedegaard, 2008a, b, c), with one role being to mediate the digital activity setting in order to generate data about how children develop STEM understandings, and the other to interpret the nuances of this data.

Motivated by investigating children's STEM concept formation, the role of the researcher was to create a digital activity setting which would provide new conditions for development. In this new activity setting the researcher was a distal participant, however, it is important to explain that whilst there was a physical distance between the researcher and the families, the motives of both were aligned. This cohesive relationality was achieved through the process of the researcher understanding the motives of family members, and using digital tools in ways which would ensure these motives were responded to and aligned with their own motive. Examples provided below outline how, through using digital tools to respond to family motives, the researcher perforated institutional boundaries and 'entered' the activity setting.

15.3 The Researcher's Dual Social Role

A social scientist must conceptualize their own participation in the researched activities including their intentions. This is because it is important to remember the aim of the research when within the research setting, which is complex when the researcher takes on a dual role (Hedegaard, 2008a). The first role is for the researcher to participate in activities where they notice the motives, projects and intentions of others. In this study, the researcher fulfilled this role by being a storyteller. As well as this, there were several data collection sessions outside the Conceptual PlayWorld intervention where the researcher would enter this role. There was also communication with families which took place between sessions. It is important to note that these interactions played an important role in building the research/family relationship which enabled the effectiveness of the overall methodological model. The second role is that of a researcher who conceptualises the observed motives, project, intentions and activities as their object of study (Schutz cited in Hedegaard, 2008b). As will be unpacked in the following section of this chapter, because of the interactional nature of the methodology in this study, the researcher observed motives, projects and intentions of research participants in real time, considering these forces as demands which would influence the process of working conceptually within the digital methodology. In this study the researcher's role also expanded to taking some of the pedagogical responsibility away from parents.

15.4 The Researcher's Use of Theoretical Concepts as Methodological Design Principles

The key theoretical concepts used as methodological design principles in this study were crisis (Dafermos, 2022), motives and demands (Hedegaard, 2008a, b, c) and leading activity (Vygotsky, 1966).

15.4.1 *Crisis*

As discussed in prior chapters, the concept of crisis has different meanings and applications across disciplines. As the name suggests, it is almost always used to describe a difficult situation or challenge, a theme which is consistent in this study. Our understanding sits within the cultural historical theory where we are guided by Dafermos' (2022) conceptualisation of the concept as helping us study a contradictory process, change or development. We live in times of unprecedented problems, and this study, which took place during COVID lockdown, demanded that we

collect data in family settings which we were not able to enter in person. Our consideration of crisis is therefore methodological, because we used it to solve the problem of how we could generate data capturing children's sustained engagement in a series of Conceptual PlayWorld interventions through Zoom interactions. The 'opposing force' (Dafermos, 2022) in this methodological crisis is that traditionally in an educational experiment, "the researcher is positioned within the activity as a partner with the researched person. This way, it is possible to examine how children contribute to their interactions with adults and other children within the family" (Hedegaard, 2008a). The study demanded that we design our methodology to enable us to use Zoom technology to position ourselves within the Conceptual PlayWorld and interact with children, capturing their responses to the intervention.

Dafermos (2022) stresses that crisis should not be seen as a static, isolated concept, but rather as part of a system of concepts. This is because crisis as a concept alone is not sufficient to understand the complexity and dynamics of the study of human development. Through viewing crisis as being dialectically related to other concepts, methodological frameworks can be developed which provide for the "dynamic interplay of past- and future-oriented temporalities", the reconstruction of which involves "the possibility of rethinking the past, re-imagining the future and changing the present" (Dafermos, 2022, para. 73). In this study, motives and demands together with leading activity were employed dialectically as a system of concepts to design the digital intervention.

15.4.2 Motives and Demands

In Chap. 12, the editors of this book acknowledge how the crisis situation led to the creation of new demands placed on families. For example, when preschools and childcare centres closed their doors, demands were placed on parents and significant adults to replace these experiences whilst also managing the existing demands of caring for young children. Within the context of this increasing demand being placed on families, a variety of demands were also placed on the researcher as they navigated their new role as a distal participant. Hedegaard's analytical concept of demands (2008a, b, c) created the shifting internal framework of this methodology. The psychological demands placed on the researcher influenced the methods she used to progress through the methodological process of developing family pedagogy.

15.4.3 Leading Activity

Vygotsky's theory of *leading activity* (1966) was used as a third methodological design principle in this study. Leading activity refers to the predominant activity, which is specific to a child's cultural age period, through which the most important

psychological and social developmental changes occur. With her knowledge of this concept, the researcher considered the different cultural age periods of siblings Mia (18 months) and Kai (three years), and how she could intentionally utilise specific digital tools to coordinate the shared attention of these two children who had distinctly different leading activities.

Like other toddlers, Mia's activity reflected her desire to receive instant gratification through the process of resolving problems immediately (Vygotsky, 1966). The researcher observed this when analysing digital data capturing interactions between Mia and her mother at home. For example, in a series of vignettes capturing an interaction where Mia and Kai are playing with a balloon, patting it back and forward between each other and laughing, we then see a pattern begin to emerge where Mia cries with frustration everytime Kai runs away from her with the balloon. Anna responds to this tension by reminding Kai to share the balloon with Mia, a demand which Kai meets. Vygotsky (1966) explains that any delay in filling a desire is very difficult for a child under the age of three, and that "ordinarily, the interval between the motive and its realisation is extremely short" (p. 78). In this example, we see that even though Mia initially feels frustration that Kai has taken the balloon, Anna mediates this situation by asking Kai to return the balloon to Mia which ensures that the interval between the motive and its realisation is short. Throughout this interaction we also notice that Anna and Mia share a focus on the balloon. Anna tells Mia to throw the ball up in the air, and as Mia does this, both mother and child laugh in delight. The researcher's interpretation of this data led her to see that Mia's leading activity was *object-centred joint activity* (Vygotsky, 1978). This activity is triadic in that it involves the child, an adult and an object of shared attention, which in this instance was the balloon. Later in the chapter we explain how the researcher used digital tools in her role as a storyteller to mediate object-centred joint activity with Mia.

In contrast to his younger sister, Kai showed an emerging understanding that his desires would not always result in instant gratification, or gratification at all for that matter. In the example of the balloon, we see that even though his motive orientation is to run away with the balloon and play with it alone, when the demand is placed on him to throw it back to Mia, he does exactly this. Vygotsky (1966) explains that children in this cultural age period develop imaginary play with the purpose of creating illusionary realisations of their desires. Once these realisations are created, the child experiences a sense of satisfaction and fulfillment. Understanding that Kai's leading activity was play utilising the psychological function of imagination, the researcher considered the ways digital tools could be used to mediate imaginary play with Kai.

Regardless of the cultural age period, leading activity is a social action which a child forms when interacting with another person. The activity is oriented toward the external world and enables them to develop new mental processes and motivations which replace their current activity so that development can move forward. Given our intention to ensure multi-age engagement in the Conceptual PlayWorld, the researcher would need to utilise her knowledge of object-centred joint activity

and collective imaginary play as tools to inform methodological practice. With this goal in mind, she planned how digital tools could provide these mediations, and how they could be placed within the narrative of ‘Sheep in a Jeep’ and the broader Conceptual PlayWorld intervention where play partners solve problems together (Fleer, 2017). The following narrative illustrates an example of how this was achieved.







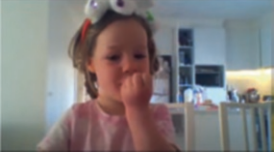
The researcher asked Kai to assist in the solving of an imaginary problem which required an imaginary solution. In this particular instance, all play partners were sheep on a farm who travelled up and down steep hills in a jeep. It had started raining which had caused the jeep to become stuck in mud, and as it did not have a roof, it began filling with water. This would not be a positive outcome for the sheep with whom the children had built empathy for. Kai responded by stating:

I am hulk ... hulk is super strong ... hulk is green and purple

Kai externally embodied the representation of strength in his arm movements as he prepared to manoeuvre the imaginary jeep. This interaction shadows Vygotsky’s explanation of children in their third year of life who feel the need to act like an adult. Kai then turned to his mother Anna and explained that he wanted the researcher to be ‘spiderman sheep’ who would take on the role of helping ‘hulk sheep’ to push the jeep to safety. This interaction again reflects Vygotsky’s thinking being that the child’s inability to perform real adult activity leads them to create “an imaginary, illusory world in which the unrealizable desires can be realized”. The child invented a new imaginary persona for the researcher to assist them in the task which they could not realise themselves.

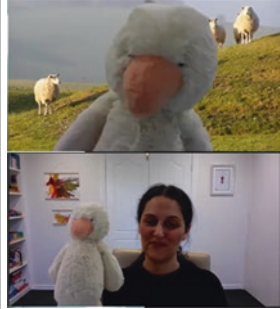





To ensure that Mia was also engaged in the collective imaginary situation, the researcher had been in contact with Anna prior to the session and arranged for a blanket to be brought to this particular Conceptual PlayWorld. When it started to rain in the imaginary scenario and Kai began pushing the jeep to safety, the researcher modeled to Mia how a blanket could be used as shelter if placed over her head. Taking this cue from the researcher, Anna placed the blanket over Mia’s head and in doing so mediated object-centred joint activity, the blanket serving as the object which both Mia and Anna were focusing on, and then activity being to position themselves underneath it to keep dry in the rain. In this example, the researcher used the concept of leading activity in response to a demand which was placed on her in the process of researcher family collaboration (Table 15.1).

Table 15.1 The digital tools provided on the zoom platform, when mediated by the researcher, were utilised as an opportunity to enhance children’s engagement in the intervention, which was the overarching motive of the researcher

Demand	Digital tool	Methodological affordance
<p>The demand is placed on the researcher to enter an imaginary world with the family.</p>	 <p>A digital background is applied and the researcher sings the ‘Push Song’ whilst pushing the gate open to enter the farm.</p>	 <p>Mother and child join in singing and pushing the imaginary gate until the researcher changes the background to a farmscape to indicate that they have entered the conceptual PlayWorld.</p>
<p>The demand is placed on the researcher to re-engage siblings in the narrative of the conceptual PlayWorld.</p>	 <p>The researcher places a hand to her ear and asks the family to listen carefully. A soundtrack of pigs oinking is played and the researcher explains that the pigs are coming to meet them all.</p>	  <p>The family re-engages with the narrative of the story. 18-month-old Mia says “pigs” and points to the screen, smiling.</p>
<p>The demand is placed on the researcher to collectively engage with the family in the imaginary situation.</p>	  <p>The researcher pours each family member an imaginary hot drink and pretends to pass it to them through the camera.</p>	 <p>The child accepts the drink and pretends to drink it.</p>

(continued)

Table 15.1 (continued)

Demand	Digital tool	Methodological affordance
<p>The demand is placed on the researcher to develop the plot in the imaginary scenario.</p>	 <p>The researcher introduces a new character to the imaginary situation (a puppet), hiding her hand out of view of the camera.</p>	 <p>The child gathers together soft toys and includes them in the imaginary narrative.</p>
<p>The demand is placed on the researcher to intentionally teach a science concept.</p>	 <p>The researcher sets up props and uses them to explain the concept of inertia.</p>	 <p>The family engages in conversation with the researcher about the concept of inertia and then replicate a similar scenario after the session ends. They record their interactions.</p>
<p>The demand is placed on the researcher to enter the role of a character.</p>	 <p>The researcher places a sheep headband onto her head to indicate that she is entering character. The researcher has arranged with the family beforehand for them to make sheep masks as character props.</p>	 <p>The family hold their sheep masks to their faces to indicate that they too are in character or sheep.</p>

(continued)

Table 15.1 (continued)

Demand	Digital tool	Methodological affordance
<p>The demand is placed on the researcher to collectively engage in the dramatic nature of the imaginary situation.</p>	 <p>The researcher holds her blanket up towards the camera and uses it to hide from the rain. The researcher has arranged with the family beforehand for them to bring blankets to the session which can be used to hide under when it begins raining.</p>	 <p>Together the researcher and family are huddled under a collective shelter.</p>

15.5 Responding to the Changing Family Context

In this study, the object of inquiry (children’s home practices) underwent a transformative change and it was important that the digital educational experiment be responsive to this changing context of family.

15.6 Conclusion

It is anticipated that this study will contribute to the cultural historical theory of human development through the conceptualization of a new methodological model which can be utilized by researchers collecting data in family settings through zoom. Whilst historically there has been a common thread of methodological demands placed on researchers collecting data within the dialectical-interactive approach (Hedegaard, 2008c), the demands placed on the researcher working with families in a digital Conceptual PlayWorld intervention are new and different. Depending on the demands placed on the researcher in the specific intervention, this methodology can be adapted to guide the researcher through the process of researcher/family collaboration.

In presenting this framework, we have tried to make a few points clear. The first is that the relationship formed with the family must extend beyond the interactions within the conceptual play. The researcher had several interviews with the mother in this family before meeting the children on zoom. This provided the family the opportunity to build a sense of trust and rapport with the researcher and feel

comfortable inviting her into their family home for the digital intervention. Ongoing communication with the family throughout the study between zoom sessions also provided the researcher opportunity for additional data collection in the form of societal, institutional and individual perspectives and the building of relationships with the family.

Another important aspect of this study is the use of Fleer's (2019) concept of coalition of practices. Fleer's research in kindergarten settings pushes back against the longstanding literature about digital learning where a binary exists between play with digital devices and play without digital devices. Fleer argues that digital tools should not be separated from existing learning programs, as doing so limits our ability to understand how practices change and new developmental possibilities are afforded with the introduction of digital devices. Moreover, Fleer stresses that digital devices cannot be separated from broader learning contexts, reporting that as new social needs arise within imaginary play scenarios, digital practices coalesce these problems which lead to children developing new motive orientations which afford developmental possibilities. Throughout interactions with the family in the study reported on in this chapter, the researcher did not highlight unnecessary attention to the meeting being online, but rather positioned themselves to focus on disintegrating the binary of real and digital forms. In line with Fleer's (2019) research, the digital device served a coadjutant for enhancing everyday family practices, enabling new ways for children to learn and develop.

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Part IV
Digitalisation of Institutional Practices

Chapter 16

Unfolding Innovation Through the Digitalisation of Institutional Practices



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Prabhat Rai , and Elin Eriksen Ødegaard 

Abstract This chapter introduces Part IV, which presents the understanding of a crisis that is relevant to the chapters in this section. As the chapters report on the dialectics of searching and re-searching for new methods of continuation of academic practices (lecturing and research), the understanding of a crisis embraces a continuous vibrating and pivoting between contradictory meanings, digital and physical spaces and innovations and their uninnovative consequences. Another important perspective on crises and the dialectics of ‘innovating out of it’ discussed in this chapter relates to the different effects of innovations on individuals with different positions in academia. While PhD students received institutional support in the form of access to supervisors’ data and their universities’ networks, allowing them to redefine and continue their research projects, the undergraduate students became invisible black screens, gradually dropping out of the educational programmes, regardless of the teacher educators’ sense of increasing competence for digital teaching and learning.

Keywords *Aufhebung* · Dialectics of crisis · Digitalisation · Institutional practice · Innovation

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16.1 Introduction

The story of a crisis that is told and retold in the chapters of this section builds on a dialectical understanding of a crisis proposed by Dafermos (2014, 2024). By going back to the Marxist and Hegelian roots of Vygotsky's theory, Dafermos (2024) intends to demonstrate how 'dialectics can contribute to the regeneration of cultural-historical and activity theory in times of dramatic, multifaceted, global crises and unfinished transformations' (p. 2). Such a theoretical reconstruction of a crisis by getting to the theory's origin seems to be Dafermos's idea of how to overcome a sort of crisis experienced by the cultural-historical and activity theory itself. Dafermos (2024) aims to 'regenerate' the theory and highlight its high responsiveness to the complex dynamics of our historical moment. As the deeper understanding of a crisis has been beneficial for cultural-historical theory, it also helps in conceptualising and reflecting on the crises experienced by academic institutions during the COVID-19 pandemic, as described in the following chapters. Before the everyday appearance of crises in academia during the COVID-19 pandemic is reflected on, the dialectic understanding of a crisis is explored in this chapter.

16.2 Dialectic Perspective on Crises

The core of the dialectical perspective on crises rests on the assumption that reality is constituted by a network of tensions and conflicting powers. From the Marxist perspective, neither tensions nor conflicts are perceived as negative phenomena. On the contrary, they are perceived as perpetual and as the fundamental drive of the historical process (Gramsci, 1971; Laclau & Mouffe, 1985; Marx, 1867), happening through changes in socioeconomic systems, unfreezing hegemonies of meaning and transforming institutional practices and individual perceptions of them. Vygotsky acknowledges the dialectics underpinning sociocultural life and agrees with Engels (1884) that the aim of reflexive work is 'not to foist the dialectical principles on nature, but to find them in it' (Vygotsky, 1997, p. 330; Dafermos, 2014, p. 157).

Aware of the complexity of tensions, Vygotsky relates crises in psychology to the impossibility of generalisation: 'the truly theoretical difficulties of the endeavor of integration of psychological knowledge' (Dafermos, 2014, p. 159). However, inspired by earlier Marxists and building on the Hegelian logics of history, Vygotsky also hopes for an *aufhebung*—a sublation that implies a simultaneous negation and maintenance of the conflicting powers and leads to the truth by overcoming tensions while remaining the essence of clashing forces (Hegel, 2018).

We know that science on its path toward the truth inevitably involves delusions, errors and prejudices. Essential for science is not that these exist, but that they, being errors; nevertheless lead to the truth, that they are overcome. (Vygotsky, 1997, p. 337; Dafermos, 2014, p. 159)

Dafermos (2024) criticises the search for truth as contradicting both the highly dynamic biography of Vygotsky and the historical transformations in Russia that he witnessed. However, he points out the high relevance of Vygotsky's dealing with the perceived crisis in psychology, which was about valuing contradictions and errors and exploring the conditions for their appearance, formation and resolution. The focus on the historical, economic and societal conditions for the appearance of philosophical problems (e.g. the impossibility of generalisation of psychological knowledge) made Vygotsky point out social transformation as the resolution.

Our science could not and cannot develop in the old society. We cannot master the truth about personality and personality itself as long as mankind has not mastered the truth about society and society itself. (Vygotsky, 1997, p. 306; Dafermos, 2014, p. 162)

The foregoing can also be interpreted as pointing to the level of social practice as the plan at which epistemological/philosophical problems are solved, as confirmed by the following quote:

The most complex contradictions of psychological methodology are transferred to the ground of practice and only there can be solved. (Vygotsky, 1997, p. 306)

Summing up the dialectical approach, it is important to underline the constitutive necessity of continuous tension between diverse ideas, between concepts and social practice, between a moment and a historical process, between a fact and the conditions for its appearance and between individuals positioned differently in society who may have different perceptions of the tension(s). A dialectical approach to crisis anchors the phenomenon in the wide network of conflicts and tension but does not identify a crisis with a conflict or tension but with sudden interruptions and cuts of these tensed complexities, after which anything could happen. Dafermos (2024) goes back to the ancient origins of the concept of crisis, where it was associated with 'the critical phase in the development of a disease, ... the point at which a patient is judged to live or die' (p. 3). Not knowing what will happen, with a wide range of unimaginable possibilities being open, is what characterises a crisis. According to Starn (1971), 'a crisis pattern could be open-ended, unpredictable, dynamic, rather than static' (p. 5).

16.2.1 Dialectics (and Crisis) Explained with the Cultural-Historical Wholeness Approach

The Vygotsky-inspired cultural-historical wholeness approach developed by Hedegaard (2005, 2009), Fler and Hedegaard (2010), and Hedegaard and Fler (2008) perceives individuals' activities as always contextual, situated and inseparable from their sociocultural surroundings. While Vygotsky describes the context in more general terms, Hedegaard (2009, 2012, 2014) offers a systematic model of it (Hedegaard, 2012, p. 130) that in this book is transformed into Cultural-historical Loop Model (Fig. 1.3, Chap. 1), to capture and unpack the dialectics and complexity

of a crisis. Nevertheless, it still embraces the perspective of (global and local) society, with its economy, legal apparatus, cultures and traditions that create demands on institutional activity settings and practices. The institutional conditions impose the demands further on different individuals operating within and across diverse institutional contexts. Individuals respond to these demands by developing different motives and activities. These motives can either confirm or challenge the expectations implied in institutional activity settings. The activity settings thus intersect with the institutional demands and individual motives and activities, which make the activity setting the lens through which the dialectics between the human and the context become visible. These are dialectics in which both the human and the context are reconstituted, and neither side determines but co-constitutes the other.

The stories of a crisis and ‘innovating out of it’, included in this section (Chap. 17, 18, and 19), draw their own circles on the multi-modal loops of the Cultural-Historical Loop Model (Fig. 1.3, Chap. 1). All the stories are related to an academic institution and refer to the institutional practices of lecturing and research, which used to be conducted in campus-based activity settings (teaching) and in the network of growing collaborations with the early childhood education and care sector nationally and internationally.

The crisis experienced by the authors of the chapters takes the form of the impossibility of continuation of the institutional practices through the established activity settings. Over a single night, it was decided that neither students nor teachers could access the campus and that PhD students would not be allowed to enter the research fields from which they planned to gather research data. At the same time, universities were demanded by the government to continue their operations digitally and not stop their educational programmes (Norwegian Ministry of Health and Care, 2020). What this demand meant for academia was the transfer of their operations and programmes to a digital space that could be accessed from an individual’s home through a digital entity and an internet connection.

As described by Alicja R. Sadownik, Marie Brandvoll Haukenes, Birgitte Ivarhus Sollesness and Kjerstin Sjursen (Chap. 17), academia became its own hologram and digital representation. The university’s digital infrastructure, which was used only as a representation of the university and its ongoing activities and as a means for correspondence and information provision before the COVID-19-induced lockdown, suddenly became the university itself. This created conditions for the appearance of new digital activity settings and activities, which could be seen as an ad hoc innovation. However, it turned out that was the long-term existence of an activity on the university’s hologram (in compliance with the government’s demand) that turned out to be the actual crisis, resulting in high numbers of students dropping out of the university’s educational programmes. While PhD students could easier transfer their research plans online (Chap. 18) with help of their supervisors, whose many networks already existed digitally, undergraduate students dealt with the crisis from their private homes, dissituated and isolated from important collectives.

The dialectics constituting the educational programmes—the dynamics of shifting between the campus and the home, between the campus and in-service kindergartens, between campus life and informal student life and between classroom

lectures and group work—were taken away and reduced to synchronous and asynchronous sessions and breakout rooms on Zoom. The social situation of the students' professional development became 'a dissituation of development' (Sadownik et al., Part IV, Chap. 17). The lecturers eventually gained mastery of the digital tools but at the same time struggled with a feeling of co-creating an irrelevant innovation that reduced the complex multi-level early childhood teacher education to a digital exchange of meanings. The governmental demand for and the teacher educators' motive of continuing the educational programmes had tensed relations with passive black screens in Zoom rooms and high numbers of students dropping out.

Thus, for the students, the crisis was about the sudden emptiness that they felt, which was impossible to fill with a digital meeting of 'talking heads' and 'black screens'. The social practice of education was cut off, which dramatically reduced the social context of teaching, learning and development. The content of the lectures could not be 'transferred to the ground of practice' (Vygotsky, 1997, p. 306), or to the social community of learners, to be solved. However, some undergraduate and PhD students seemed to do well and experienced meaningful progress in their projects and learning.

While some undergraduate students, supported by their families, travelled around Norway and logged in on Zoom lectures from their tents on coasts or mountaintops, PhD students, in close dialogue with their mentors, co-created strategies for overcoming the challenges.

In the Chap. 18 written by Czarecah Oropilla's we read about the co-creation of a new research design with the participation of the supervisor and private networks, and in the Chap. 19 written by Baizhen Ciren, we read about the implementation of open data policies and data sharing (which were not highly popular in qualitative research before the COVID-19 pandemic). The process of redefining research designs is not free of dilemmas. Oropilla uses the metaphor of pivoting to capture the dialectics of the process: having one foot standing while the other probes the possibilities of moving forward and quickly considers how to move forward towards signals coming from outside.

In basketball, pivots are made by players as they stand in one place, with one foot on the ground and the other being used to change their direction as they ponder on their game plan on where best to bring the basketball. (Oropilla, Chap. 18)

Nevertheless, in contact with the research community, which creatively 'ponders' new methods (Lupton, 2021), Oropilla overcomes the stagnation in her project.

Ciren (Chap. 19) captures the pondering of how to move forward with the metaphor of unfolding DNA molecules of twisted motives and goals tightened up with restrictive conditions of no travel, which finally unfolds the idea of data sharing. The old demand of the Berlin Declaration (2003) was never really employed in social qualitative research, unless the crisis entwined with the motive of caring for early-carrier researchers.

Apart from data sharing, a range of other methods unfolded and allowed the research practice to continue through the university's hologram. The satisfactory outcomes of these innovative, digitally based solutions allowed us to reflect

critically on activity settings and institutional practices from before the pandemic. Being locked on the hologram forced us to pivot further digitally and thus allowed to experience how much of the digital potential was never used in the university's institutional practices. Realising this resulted in diverse hybrid forms of participation in research and the transformation of different educational programmes accessible to students who could not move to an urban setting to study (White Paper No. 5, 2022–2023).

16.3 Back to Normal?

This dialectics of the physical and digital form for teaching, learning and researching, allowing to develop new hybrid forms, made the 'back to normal' that many have been waiting for since the COVID-19 pandemic, impossible. The 'normal' that we experienced after the pandemic intertwined the physical and digital activity settings in ways that we could never have thought of if not for the experience of radically different conditions in our societal, institutional and personal lives.

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Chapter 17

When Early Childhood Teacher Education Becomes a Hologram: Innovating Motives and Uninnovating Dilemmas



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Abstract On March 12, 2020, all university campuses in Norway shut down due to the outbreak of the COVID-19 pandemic. The Norwegian government then provided institutions of higher education with policy guidelines informing them that they were expected to develop alternative, digitalised forms of teaching to enable their students to continue and complete their studies without delay. This demand reduced the university to a hologram amid the expectation of an uninterrupted continuation of its educational programmes. This situation forced individual teachers to employ innovative thinking and led to institutional (re-)searches for new activity settings that could be established in the digitalised university. These individual and institutional (re-)searches anchored on the motive of *continuation* are the focus of this chapter. Even though digitalisation was reported by the Norwegian government as successful, we see it as tantamount to a reduction of learning and as ‘dissituated’ learning and thus argue for careful innovations extending the activity settings of professional socialisation.

Keywords Digitalised university · Dilemma · Motive · Institutional practice · Uninnovation

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17.1 Introduction

The cultural-historical wholeness approach's view on developmental crisis highlights its contextual character intertwining the personal, institutional and societal plans. The individual development is viewed as sometimes taking on 'a stormy, impetuous and sometimes catastrophic character that resembles a revolutionary course of events' (Vygotsky, 1998, p. 191). Such critical and 'stormy' episodes must however always be related to the demands and expectations of the institutional settings in which the individual is operating (Fleer & Hedegaard, 2010; Hedegaard, 1998, 2008). The societal plan of rules and regulations and the culturally anchored value positions and daily operations of institutions are not less important than individual experience. This means that a crisis is not only a personal or individual phenomenon but one lived in dialectics within the societal and institutional contexts. Moreover, a crisis is not only a negative and destructive force characterised by 'disintegration and breakdown of what had been formed at preceding stages' (Vygotsky, 1998, p. 192) but also a formative course, without which humans 'would not have anything to strive for and, of course, would not be able to create anything' (Vygotsky, 2004, pp. 28–29).

In this chapter, we examine early childhood teacher education (ECTE) taking 'a revolutionary course of events' (Vygotsky, 1998, p. 191) when dealing with the governmental demand for full digitalisation and uninterrupted continuation during the COVID-19 pandemic. What this demand implied was a total stop of the existing teaching–learning activity settings in ECTE and an uninterrupted continuation of educational programmes without new activity settings in place. The new activity settings were supposed to be established digitally in the university's digital space, which previously only featured ongoing institutional activities and was used to store information and documentation related to teaching–learning activities. This means that due to the new regulations, the established settings related to teaching–learning activities were dissituated and transferred to holograms but were expected to function as they did before.

In this chapter, using the Cultural-historical Wholeness Approach, we reflect on teachers' individual and institutional innovative searches and re-searches for activity settings that would allow ECTE to continue as a study programme during the COVID-19 pandemic. We start by describing the new set of rules imposed on the Norwegian university sector on March 12, 2020. Then, our study conducted among ECTE teacher educators in Norway is presented. The main themes draw on complex experiences of the dissituated ECTE, which we discuss from a cultural-historical perspective. As there were successful stories but also stories painting a picture of a secondary crisis caused by digitalisation, we argue for careful innovation underpinned by the right value-based motives allowing an extension of the situated learning.

17.2 Lockdown and Political Demand for Continuation of Dissituated ECTE

The lockdown prompted by the outbreak of the covid-19 pandemic imposed a set of new demands on Norwegian higher education institutions. On March 12, 2020, the Norwegian government (Norwegian Ministry of Health and Care, 2020) obligated all higher educational programmes to proceed digitally, with a clear message of no delays and no postponing of any of the milestones in students' progression. This meant an imposed demand for both full digitalisation and uninterrupted continuation of academic programmes despite campuses' shutdowns.

ECTE in Norway is constituted by activity settings that *situate* the students and teacher educators in diverse learning communities both on campus and in in-service kindergartens. The situated learning (Lave & Wenger, 1991) underpinning the organisation of ECTE is anchored in the sociocultural perspective on learning, whose principles are in line with Hedegaard's (1998) conclusions on cognitive apprenticeship in meaningful activity settings: '(a) learning should be grounded in a practical world of everyday life; (b) it is important to learn the strategies of a culture and (c) students are agents of their own learning' (p. 117). The digitalisation of ECTE dissituated the students and teacher educators from their practical worlds consisting of learning communities and professional socialisation at the campus and in-service ECTEs. The dissituated continuation of ECTE demanded other kinds of agency, motives, competence and tools both from the teacher educators and students. What these demands were was not entirely clear at the start but unfolded in the process of trying to meet them. The process started with being thrown into a new teaching reality 'just like that'. As one of us, teacher educators and authors of this chapter, noted during that time:

And just like that, from Monday onward, I, who can barely handle the basic functions of my own PC and avoid technology as much as possible, am supposed to lecture online, share the screen with my students, help them log in and motivate them to participate in our online activities.

The dissituated ECTE demanded that the students track the information communicated to them online, that they devote more time to self-study and that they practise more self-discipline (NOKUT, 2021). For students enrolled in the ECTE programme consisting of teamwork-based activities both at the campus and in-service early childhood education and care (ECEC) settings (Universities Norway, 2018), where learning was deeply situated in group activities, a sudden shift demanding high level of self-organisation, self-discipline and self-study was a game changer. For teacher educators, it was clear that following up on their students' professional socialisation and continuously assessing the professional suitability of teaching activities, which ECTE teacher educators are expected to do, would be difficult in the new settings. As one of us—authors—noted about a month after the start of the implementation of full digitalisation:

Professional socialisation happens in all these learning communities and relationships among the students, in their activities in the in-service ECEC settings and in their communications with us. The core values are shared in and through being together in these diverse settings. Following up on the students in all these communities allows us and them to assess their suitability to the profession—that is, if they can work closely with other people, especially with children. How can we assess this on Zoom?

In view of the new demands, teacher educators started individual explorations of accessible digital tools. Shortly after, the university offered an array of online courses and helped the teacher educators plan digital teaching sessions.

17.3 ECTE Becoming a Hologram

We developed a survey questionnaire for use in determining how ECTE teacher educators at other universities and colleges in Norway dealt with the new demands and what solutions they created to safeguard situated learning under the dissituated ECTE. Copies of it were distributed in June 2020 among all institutions in Norway offering ECTE programmes, and 120 teacher educators answered the questionnaire. As the number of respondents was not representative of the population of teacher educators, we focused on a qualitative analysis of the free-text answers to the question ‘What were your experiences as a teacher of the digitalised ECTE?’ The analysis followed Hedegaard’s (2008) three levels of interpretation:

1. Common sense interpretation
2. Situated practice interpretation
3. Thematic interpretation

The answers draw a thematic landscape of the teacher educators’ very diverse ways of dealing with the new demands of the dissituated ECTC. As presented in Fig. 17.1, the informants experienced being in a *demanding* and *developmental* process. However, they perceived their development as an *irrelevant mastering* and a private pleasure or learning of new things, ‘while the digital ECTC as an educational programme was not living up to the ECTE guidelines’ (informant 104).

What was experienced as particularly *demanding* was enhancing and sustaining interactions between the ‘talking heads’ and ‘black screens’. The lack of interaction and reactions from the students made the teacher educators insecure about the students’ understanding of the transmitted content, and thus blocked the ‘natural’ process of making spontaneous adjustments and providing extra explanations. The lack of interaction during teaching sessions also demanded more work from the teachers, such as preparing scripts so that the necessary knowledge would be transmitted and long moments of silence could be avoided.

The *developmental* experiences were connected to institutional practices where teacher educators responsible for particular courses initiated digital meetings in

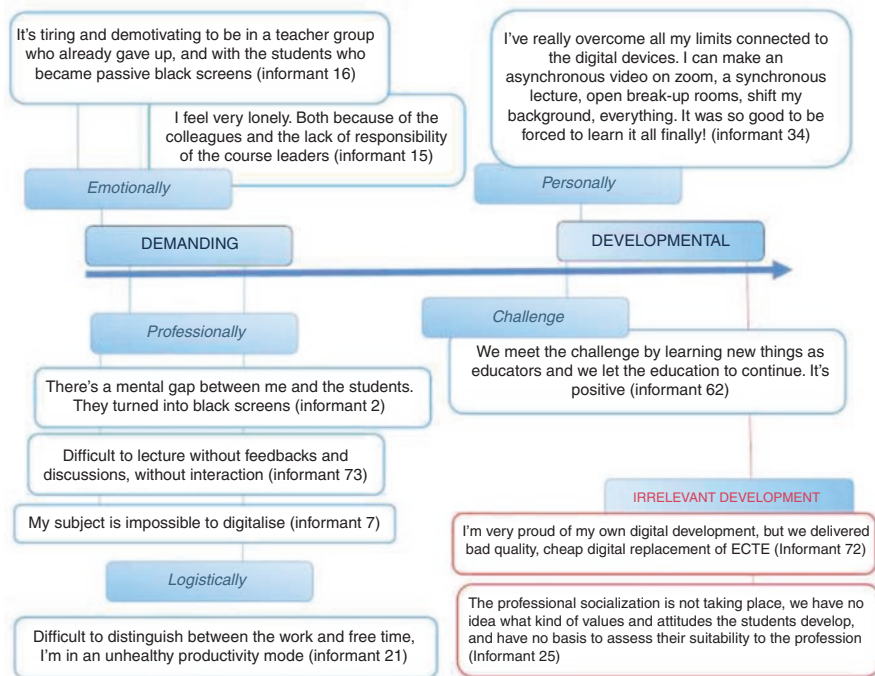


Fig. 17.1 Overview of qualities of teacher educators' demanding–developmental experiences of ECTE digitalisation

which experiences and emerging digital pedagogies were exchanged. Additionally, many universities' arranged courses for the educators and lecturers, introducing new digital teaching tools. These were also seen as a learning experience, allowing to try synchronous and asynchronous teaching forms and explore the new Zoom function of 'breakout rooms', which allowed the students to interact in smaller groups with the camera on, thus with less anonymity and greater responsibility. Developing new digital skills that enabled good digital sessions on Zoom made some of the teacher educator respondents very proud of themselves and their own learning. However, many of them also emphasised that their own joyful mastering of new digital skills was not relevant to providing their students with a good, socially situated education because a digital teaching session cannot replace the social settings through which ECTE facilitates the professional development of pre-service teachers.

Figure 17.1 presents the diverse ways in which the respondents experienced the digitalisation/dissituation of ECTE as demanding and developmental, which is in line with Vygotsky's (1998, 2004) understanding of dealing with crises as disruption and development in relation to new demands.

17.4 From Private to Collective Innovating

From a cultural-historical perspective, the responses pointing out the significance of ‘coming together’ and sharing experiences of being a teacher on the hologram of the university are highly interesting. This ‘coming together’ initiated by teacher educators responsible for particular courses can be interpreted as a new, emerging activity setting on the ‘hologram university’, allowing meaningful, collective meta-reflection on the ongoing dissituated teaching–learning processes. The correspondence between the activity setting’s demand for sharing and the commonly experienced need for sharing made this activity setting particularly meaningful for teacher educators. The meaningfulness and relational character of the activity setting seemed to have allowed teacher educators to *situate* their dissituated teaching experiences and their new, still ‘dissituated’ digital knowledge transmitted during their massive coursing. As one informant experienced:

I was thankful for the course leader-initiated meetings among the teacher educators involved in that course. It was there that I understood the breakout rooms, which I didn’t get during the course I was attending. Hearing how others implemented them in their teaching motivated me to try them. However, I struggled with motivating the students and finding a setting that could allow ‘live’ group work, like that in the classroom. (Informant 72)

The aforementioned activity setting, by being one more activity setting ‘on the hologram’, also seemed to facilitate the teacher educators’ sense of belonging to the dissituated university and a sense of togetherness with other teacher educators, even though they were not able to meet them physically. However, not all of the teacher educators met in such teams, and some of them experienced metacommunication about the digital teaching sessions only with the students:

The courses I was attending to improve my digital skills transmitted information about the new tools and how to use them incredibly fast, so I was not able to discuss the didactic use of the tools with my colleagues. My dialogues with the students were more about trying synchronous and asynchronous teaching. I was glad about that, but I knew I was missing a deeper didactic discussion. (Informant 1)

The ongoing ‘digital didactics’ was briefly and superficially discussed at the start of diverse meetings, while waiting until everyone had logged in, fixed their audio settings, and dealt with other preliminaries. The motive of discussing the sudden digitalisation of professional education and its consequences led us to contribute to a sociological blog (Haukenes & Sollesnes, 2020; Sjørusen & Hjelle, 2020) run by the University of Bergen and document the functioning of different social institutions during the COVID-19 pandemic. Working with the texts of our conference presentations on that subject (Sadownik et al., 2020a, b) and creating the survey questionnaire constituted another digital activity setting for us, *situating* our explorations and experiences of dissituated teaching experiences at the hologram university.

The aforementioned digital activity settings strengthened the teacher educators’ sense of belonging to the ‘hologram’ and their sense of its reality. The digital university was no longer ‘just a representation’ of the institution but the institution itself. Moreover, the teacher educators were no longer lonely in their explorations of

digital teaching. They were there together, bound together by the feeling of contributing to the continuation of society and its institutions. In time, the teacher educators were able to master the digital technologies and started realising that it would be easier for them to focus on the stories of their successes in their own learning, the happy-ending stories of their students completing their education on time and positive experiences of the teaching sessions. The teacher educators obviously missed the physical meetings and spontaneous chats and coffee breaks on campus, but they organised morning coffee and lunch breaks on Zoom app, making their days on the hologram very comfortable. The success stories that strengthened and rewarded their efforts were about the following:

- Students making the most of their study time during the pandemic by joining the teaching sessions via Zoom from their tents on mountaintops or amid other spectacular nature scenes, thanks to mobile data
- Students taking responsibility for their own learning during the pandemic and entering Zoom sessions very well prepared, ready to get the most from the digital lectures
- Contacting students who wrote bachelor's theses on similar topics so that they could meet digitally and discuss their writing processes together
- Moments when students' 'black screens' eventually revealed the 'talking heads'
- Our scripts for the teaching sessions that allowed us to communicate the most important knowledge and avoid long moments of silence
- Our experiences of collaboration with MediaLab at our university that allowed us to make high-quality videos for asynchronous teaching.

The aforementioned stories shared supported the teacher educators' motive of continuation and were in line with the demands and rewards communicated by their institute's leaders. Messages acknowledging the great digital job that the teacher educators were doing were sent regularly. Additionally, the university organised home-delivered flowers to thank the teacher educators for their efforts and during whole-day digital meetings, tasteful lunches/breakfasts were delivered at their doors. They were no longer alone on the hologram; they were together as teacher educators.

17.5 A Crisis of Irrelevant Innovation

Another theme developed in the analysis of the free-text survey data: *irrelevant mastering* is also very interesting and worthy of reflection from the perspective of the cultural-historical approach. Utterances on irrelevant competence development leading to irrelevant ECTE seemed possible when the teacher educators' activities in the (joyful) activity settings on the hologram were related to value positions underpinning ECTE's original pre-pandemic guidelines and rules and stories of students who 'dropped out' of the 'hologram university'. The following are examples of such responses, which we classified under the theme of 'irrelevant mastering':

I'm very proud of my own digital development, but we delivered a bad-quality, cheap digital replacement of ECTE. (Informant 72)

Professional socialisation did not take place. We had no idea what values and attitudes the students were developing, and we had no basis for assessing their suitability for the profession. (Informant 25)

Reading the aforementioned quotes and others like them made us reflect on how the teacher educators' joy due to their own digital learning and their success in meeting the governmental demands displaced their worries about the quality of the delivered education. The joy of own digital development also removed from the picture the perspective of the students who slowly 'dropped out' from the dissituated ECTE programme. The administration pegged the number of students dropping out of the ECTE programmes at the university's three campuses at 104, with the number typically oscillating from two to seven students per year.

According to a NOKUT (2021) report, 10% of all students in Norway had the responsibility of taking care of their own or other children in the family during the COVID-19 pandemic. However, among ECTE students, over 25% needed to take care of children (NOKUT, 2021, p. 48). Moreover, only 25% of the ECTE students in Norway declared having a suitable place for participating in digital education; 27% declared not having such a place, and 48% declared not having a place that was suitable enough for such a purpose (NOKUT, 2021, p. 49). Neither were the students' economic situations optimal. Due to the COVID-19 pandemic, many of them lost their jobs and had to find new jobs that did not allow them to participate in their studies as before. Moreover, loneliness, decreasing motivation and significantly deteriorating mental health escalated among students across educational programmes (NOKUT, 2021). Students clearly missed engaging with each other in activity settings that were in line with the ECTE guidelines. Not only did the transition to the hologram fail to develop activity settings that could match the real-life ones and impose the demands of self-discipline, self-studying and self-responsibility for one's learning, but it also denied universal access to a suitable place and infrastructure for digital learning (NOKUT, 2021) because not all students had these.

As mentioned earlier, in the case of ECTE, the new demands were very different from the original ones. Specifically, situated, relationship-based education happening through participation and learning in teams demanded being a good team member or leader and having good communication skills, empathy and flexibility in terms of the group process. The sudden change in demands, highlighting self-leadership, self-discipline and the minimalisation of the societal context to breakout rooms, made some of the originally well-functioning students into demotivated and isolated individuals struggling with situating themselves on the hologram. Those who 'did well' in the digitalised setup claimed they would learn much more on open campuses and with on-campus physical learning/teaching activities (NOKUT, 2021).

The general impression of reduced learning under the dissituated ECTE could be connected to another kind of learning that became dominant during the asynchronous video lectures and the better scripts that synthesised what the students needed to know to be able to take exams without delay and that allowed them to avoid

uncomfortable moments of silence during teaching sessions. Through the practice of developing more detailed scripts of what should be ‘transmitted and communicated to the students’, the teaching sessions became more dyadic, with the knowledgeable teacher actively communicating the knowledge to passive learners (Hedegaard, 1998). The teaching sessions transformed from socially situated and dialogical into knowledgeable monologues.

Although the teacher educators focused on creating meaningful and situated problems (Hedegaard, 1998) to be discussed in breakout rooms, the students could not relate the discussed problems/cases to experiences ‘within the culture of practitioners’ because they did not have access to in-service ECEC settings (Hedegaard, 1998, p. 116). They were learning ‘without the culture of practitioners’ and without the campus community of pre-service teachers and academics. Their learning, based on the teacher educators’ knowledge transmission, became dissituated, disconnected and thus demotivating to participate in. As one of the teacher educators stated:

I received several messages from the students saying that they had nothing to talk about in the breakout rooms. They wrote that they found it difficult to relate the questions or task to the literature and that the task was meaningless because they lacked practical experience. Some mentioned that even if they passed all the exams without delay, they wouldn't become good early-year teachers. (Informant 23)

The aforementioned quote and other critical responses of teacher educators need to be taken seriously when reflecting on the (un)innovative qualities developed during forced digitalisation.

17.6 The Danger of Neoliberal Motives Colonising Digitalisation

Despite the critical responses of teacher educators, the digitalisation of ECTE was officially communicated as a success. ‘We did it!’ was proclaimed in many proud e-mails from the institute leader and the dean. Rapid digitalisation started as an imposed demand, but it eventually became an internalised motive, and the fact that the great majority of students completed their studies without delay (NOKUT, 2021) drives us to consider digitalisation successful. The successful experience is mentioned in White Paper No. 5 (2022–2023) on long-term planning for research and higher education, which states that further digitalisation will make higher education accessible for everyone from every place in Norway (p. 21).

However, looking at the motive of digitalisation after the pandemic through the lens of the cultural-historical wholeness approach will enable us to see it in the context of the other motives and values underpinning it. The motive of making higher education accessible to all is in line with egalitarian values and sustainable thinking, but the fact that situated activity settings are crucial for fostering knowledgeable and ethical professionals under ECTE sheds a different light on the programme’s digitalisation. The facts and empirical examples draw a picture of the full

digitalisation of ECTE as an unfair reduction of important professional experiences, risking sending ‘quasi-qualified’ professionals to ECEC settings.

However, a digitalised ECTE will definitely be cheaper, and as temporary academia is highly entangled with neoliberal capitalism, we cannot exclude the possibility that some processes are underpinned by economic rather than ethical values. To safeguard the quality of ECTE, we advocate future innovations supporting crucial learning relationships and using digital tools to support and replace sociality.

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Chapter 18

Researching Intergenerational Engagements and Programmes During the COVID-19 Pandemic: A Methodological Reflexivity on Research Pivots



Czarecah Tuppil Oropilla 

Abstract This chapter explores methodological reflexivity in studying intergenerational engagements and programs during the COVID-19 pandemic. Societal regulations, aimed at reducing infection risks, have inevitably impacted interactions between young children and older adults within families, communities, and early childhood education and care settings. The pandemic is thus framed as a crisis that posed challenges, leading to adaptations, transitions, and transformations for the researcher, who, at the time of writing, was a PhD candidate. These methodological shifts are viewed as ‘pivots,’ opening new research opportunities and fostering the researcher’s growth. Drawing from personal experiences, the implications of using digital platforms in research are discussed. The focus is on the researcher’s reflexivity and positionality, emphasizing the need for creative and innovative research approaches to navigate through the crisis.

Keywords Creative navigation · Digital platforms · Digital research · Intergenerational engagements · Reflexivity

18.1 Introduction

The pandemic caused by the COVID-19 pandemic triggered societal, institutional and individual responses worldwide (United Nations, 2020). Social science researchers have been some of the hardest hit by the pandemic. Social science research entails having to engage and build relationships with prospective and actual

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participants. There are social aspects to consider from planning the project, gaining access to the participants, sending them information about the research, presenting yourself as a researcher, asking for their consent, conversations on clarifications about the project, and so on. Usually, researchers set-out into data generation prepared with the correct methods and tools to answer research questions. But during the time of the pandemic, all these plans had to either be halted, cancelled or re-worked.

This chapter is a narrative of my research experience as a PhD candidate working on an intergenerational research project during the time of a pandemic. My experience might not be a unique one as there are thousands of PhD students and researchers who have had to pivot during this time. This pivot—which is what I like to call the point of transition of my project—could be viewed by others as resilience. In my view, this pivot was key to survival.

In this chapter, I will talk about the intertwined dilemmas, motives and actions brought about by the conditions of the crisis affecting my decisions for pivoting to an entirely different research design. In this, I lean on Hedegaard's (2008, 2009) cultural-historical wholeness approach in order to demonstrate how societal and institutional regulations and practices have formed the conditions for my individual pivot. I will talk about the dilemmas I faced in the form of the demands and conditions that regulations during the pandemic brought. I will also discuss my motives for pushing on with my research project, and how I was able to formulate new action plans through digital methods.

I will also talk about the transformations to the methods I have chosen to still be able to do research intergenerational engagements and programmes between young children and older adults. In this light, the book chapter aims to unpack researcher reflexivity throughout the research process.

18.2 Research on Intergenerational Engagements and Programmes

Over the past recent decades, there has been a growing body of literature describing the growing age separation within societies (Kaplan, 2002). Due to advances in technology, older adults are living longer but are more prone to being socially isolated. Younger children in some countries have been found to have little opportunity to interact with older adults. This pattern of increasing age segregation has been “linked to the decline in life satisfaction among older persons and the increase in negative stereotypes toward the aged and aging among younger people” (Kaplan, 2002).

Intergenerational programmes are systemic efforts to bring younger generations and older generations together. The US National Council on Aging (1981) has defined it as activities or programs driven by institutional policies that increase cooperation, interaction or exchange between any two generations, particularly

between the youngest and oldest generations, otherwise referred to as book-end generations. These programs involves the sharing of skills, knowledge or experience between old and young to promote mutual benefits and foster relationships. Further, these programs are conceptualized with aims to meet needs of both populations by fostering growth, understanding and friendship between generations, and enacted within the best interest of both populations that are considered more vulnerable and dependent on society.

However, there are countries and contexts where institutional intergenerational programmes are rare, and in some cases, do not exist. Countries, such as the Philippines, do not have a lot of institutions that cater specifically to older adults and the elderly because caring for the older generations primarily lies within family settings (Oropilla & Guadana, 2021). As such, there must be a recognition of this context in my study in the terminologies used: intergenerational engagements are more informal initiatives that occur in family and community settings and intergenerational programmes that are more formal and are anchored in institutional practices. These operational definitions align with the place-based conceptualization of intergenerational contact zones (Kaplan et al., 2020). As such, it was also important for me to be able to include both these formal and informal intergenerational contexts in this research project.

Within the cultural-historical perspectives that is theoretically relevant to this research project, it was important to acknowledge that the social conditions of children, their environments and the people they constantly interact with have transitioned and transformed in the light of the regulations and policies relevant to the time of the crisis. As such, it was important to recognize their lived experiences in their households and communities as rich data sources for authentic lived experiences that have changed according to the demands of an arguably historical time period.

18.3 The Dilemma: Implications of the COVID-19 Pandemic to IG Research

The COVID-19 pandemic impacted global nations and local communities in many ways—work-force dynamics shifted to virtual platforms, schools and kindergartens closed temporarily, airports and borders were closely monitored, and some borders have closed down. Trips, plans, events have been cancelled. Everyone was asked to stay home and practice social distancing to prevent the spread of virus. Families were forced to stay home, and work or study from their households.

Societal regulations during the pandemic created dilemmas as the conditions brought about new sets of demands. The dilemma came in the form of implications of the COVID-19 pandemic to research. PhD candidates such as myself experienced this societal situation and dilemma as a crisis, most especially in terms of research-design plans and methodology. This was true particularly for my project on

intergenerational experiences of younger children and older adults. In partnership with a couple of Norwegian kindergartens, initial plans included staging intergenerational events and activities for younger children and older adults to share. These events were to be venues for co-narrations and co-creations to happen. However, as kindergartens were shut-down temporarily for six weeks, and older adults being most at-risk of getting infected by the COVID-19 virus, the original research design had to be foregone to protect all groups. Early on, I had a realization that I would not be able to push through with researching with children and older adults—at least not in the traditional sense. My research design and plans had to be re-worked. It was at this point that the pivots came in.

In basketball, pivots are made by players as they stand in one place, with one foot on the ground and the other being used to change their direction as they ponder on their game plan on where best to bring the basketball. They pivot around, pondering on whether they should pass the ball to their teammates or whether they should take the next step themselves while dribbling the ball lest they be charged with a traveling violation. While I am not the biggest basketball fan, I have always had tremendous respect for athletes for being quick on their head and feet. In a matter of split-seconds, they can assess and evaluate their situations to change their direction and actions while also collaborating with their teammates. I took inspiration from their game play and used this metaphor as I navigated my PhD research project. Knowing that there are many several ways to ‘shoot the ball,’ how should I proceed?

As I pondered on re-designing my project, some of the dilemma, thoughts and questions came into my mind. I wrote my thoughts down to come up with a feasible “gameplan” and/or new angle for my research project.

The dilemma I have enumerated below are brought about by the societal demands and conditions in the form of global and local rules and regulations that everyone have had to comply with during the time of the pandemic. All aspects of life—social, material and environmental aspects—have had to be manipulated in order to participate safely. Safely, during the time of the pandemic, meant choosing options that have the lowest risk for spreading or catching infection. This translated to limitations and conditions to social interactions—to maintain social distancing, keep a distance of at least 2 meters from each other. In terms of material and environmental conditions, restrictions were set in place such that one had to observe physical boundaries that cannot be crossed. All these conditions posed demands on everyone that had to overcome—truly a time of crisis that warranted changes in practices and actions in order to learn, develop and succeed. Ultimately, overcoming the dilemmas could be viewed as part of my formation to become a more experienced researcher.

18.4 The Motives

During this difficult time, I could say that the motives of my research pivot were mostly personal but supported/guided/influenced by institutional practices that enabled/allowed me to take a step further from where I was at the onset of the

pandemic. My main motive was to finish my PhD within my funding period. Even before the pandemic, I have already set a very strict and set of deadlines for myself. During the pandemic, I knew I had to move quickly so I could still be productive. I had to overcome the dilemmas by holding on to my personal motives—my “whys,” or the main reasons why I embarked on this research journey in the first place.

While of different foci, I think of the process as similar to what Marianne Hedegaard (2019) wrote about as she addressed a dilemma relating to conducting research on children’s thinking and concept formation in which the researcher also participates. In her paper, she has had to talk about the dilemma, the motives and she also drew on her personal biography in order to sort out the actions necessary to overcome her dilemma (Hedegaard, 2019). She examined institutional objectives as well as children’s motive orientations as well as her own, which is also something that I will do in the following sections of this book chapter.

While finishing the PhD within a given deadline was my main motive for making calculated pivots, I had several other motives related to the research curiosity within my subject and overcoming the dilemma of researching on intergenerational engagements and programmes between young children and older adults. I had to find a way to understand these activity settings, especially in the light of the pandemic that seemingly had a huge impact on social relations. There were several questions in my head that contributed to the motive of finding out answers related to my research project:

- How did the pandemic crisis affect relationships between older adults and younger children?
- How can intergenerational engagements and programmes be sustained during these times?
- How else do intergenerational interactions happen? In what forms? How frequent? What kind of tools/artefacts are used? Do they use other applications, like the ones specially designed for long-distance relationships? What other activities do they take-part in?
- In terms of generating data, balancing protection of at-risk groups and exploring research questions:
 - Is it possible to do purposeful snowball sampling to have some case studies to explore these questions?
 - Can I generate data through video/ phone interviews since I cannot be in their homes?
 - Can I ask the families to document intergenerational interactions themselves?

The Norwegian government had a press conference for children on 16th March, 2020 where they addressed children’s concerns and questions about the pandemic. The children had different kinds of concerns—when will school be re-opened, what should they do about cancelled birthday parties and travel plans with the families? There was also one que there was a question from the children about how to interact and communicate with grandparents who are older than 60 years old. The Norwegian government’s response to the children’s questions are aligned with Elin Eriksen

Ødegaard's advice as published in the local newspaper: be creative—use different virtual platforms like Facetime, Skype, etc. to talk to grandparents (Drægebø, 2020).

Inspired by this response to the children, I took this as an encouragement to think outside of the box, beyond my original research plans. Like the children, I also had to be creative in re-planning my research in order to overcome the dilemmas presented by the present conditions. However, to be able to do so, I needed to make sure that my next steps would be supported by the people within my research environment such as my supervisors, but also of the research institution to which I belong. Thankfully, I have received support from my supervisors who have directed me to look at different methods that could be used for fieldwork during a pandemic (Lupton, 2021). The university also provided support to PhD candidates during this time by (1) extending work contracts by at least 1–4 months, (2) providing a fixed budget for purchasing necessary equipment, or being allowed to borrow monitors, docking stations and office chairs for workspaces at home, and lastly (3) offering hotlines for mental health concerns. Being a foreign PhD candidate during the pandemic was particularly stressful because of all the uncertainties not just in the country where I was based, but also in my home country. Having these support was very much appreciated as it addressed not just cognitive dilemmas, but also some emotional dilemmas as well. In addition, the PhD committee was also very supportive of changes that needed to be made in order to continue research projects during this time. As the Norwegian government obligated higher education institutions to continue educational programs without any delays of the planned milestones for students, the PhD programme committee understood the need to be flexible to new research plans. In line with this, I have received reassurance that I could make changes to my research plans not least from the Norwegian Centre for Research Data [Norsk senter for forskningsdata] (NSD) where I sought ethical clearance. These institutional practices during the time of the pandemic created conditions that allowed me to act and move on.

18.5 The Actions

In order to continue research to understand intergenerational engagements and programmes particularly within the context of the crisis that was the COVID-19 pandemic, the research pivot that I had to make was an unfolding of innovation, creativity and resourcefulness through digital means. As such, I turned to online data generation in order to push through with my research project.

As I prepared my pivot, I was inspired by some suggestions for doing fieldwork during the pandemic. Dr. Deborah Lupton (2021) started a crowd-sourced document where many researchers all over the world sent in low-infection and low-risk methods to generate data during the times of the pandemic. It was an early recognition that researchers all over the world have been affected drastically by the pandemic, but also an acknowledgment that innovation could be attained by collaborating and sharing of ideas.

Below are methods that I have considered—some of them I have made use of, and some of them I had to modify in order to be culturally-sensitive to the participants. I will discuss the final methods I have utilized in the next section of this chapter:

18.5.1 Epistolary and/or Semi-structured Online Interviews

Epistolary interviews, as first described by Debenham (2001) are asynchronous, one-to-one interviews mediated by technology. This is also a recommended method of doing fieldwork during a pandemic as these interviews will be done on online platforms to ensure that risk for transmission of infection is lowered to none. Research participants were sent open-ended and probing questions through email that they can respond to when the time is suitable for them. This method supposedly gives them time to think about the questions and their responses. I had hoped that this will also result to thoughtful exchanges between myself and the participants, developing our relationship further. I thought that this method was particularly advantageous as it gives a neutral arena for both myself and participants in using a language that is not our mother-tongue, especially in the Norwegian data generation. Additionally, this method was supposed to allow me to conduct several interviews simultaneously and not have to transcribe their answers, and data from one interview can prove useful in other interviews. However, early on, I received feedback from one of the teachers in a Norwegian kindergarten that it was better if they can just send in their responses through online survey forms.

18.5.2 Online Form and Photo/Video/Voice Elicitation

An online form was made in SurveyXact was disseminated through email and Facebook to targeted groups that included families with young children and older adults. This online form had open-ended questions that sought narratives of intergenerational interactions and activities of younger children and older adults while on lockdown. It also included open-ended questions asking about the tools used for these interactions. Additionally, research participants were given an option and instructions to send photos and video documentation of these activities—making the photos and videos participant-produced.

Another online form was created in collaboration with *Livsglede for Eldre* (The Joy of Life for the Elderly) to understand the transitions and transformations to intergenerational programs in kindergartens in Norway during the time of the pandemic. The questions in the online form also served as the jump-off point for the probing questions for the online focus group discussions.

18.5.3 Online Focus Group Discussions

Focus group discussions of six practitioners from different Norwegian municipalities were undertaken. Focus group discussions can offer a lot of information on a topic in a relatively short time. For this research, the focus group discussion was a venue for early years practitioners to share their thoughts and opinions and possibly generate ideas on intergenerational programmes in early years settings in Norway.

18.6 The Transformation

Ultimately, I undertook intergenerational studies in two different contexts and countries; transitions and transformations to intergenerational programmes in kindergarten institutions in Norway and intergenerational engagements within multi-generational families in the Philippines (see Table 18.1).

As above, I had to align the transformations to my research methodology to the ongoing social conditions of the time. This entailed choosing low infection risk methods using online platforms and tools. There were many additional advantages to using digital platforms for research during this time. One such advantage was the possibility to generate data simultaneously with participants from different parts of the world—saving on travel costs, energy and time. This also afforded the participants to respond on their own time, under their own terms as it was a time of transition and transition for everyone. However, as it was a difficult time for everyone, it also proved difficult to gain access to participants. In the end, the participants from the Philippines came from my own social circles, with whom I have already established trustful relationships. In Norway, cooperating with *Livsglede for Eldre* was key to gaining access to a wider network of participants. Having both international and local networks to collaborate with is something that I remain grateful for to this day. After all, social science research entails social cooperation, trust and reciprocity to work.

Table 18.1 Summary of research methods

	Intergenerational programmes in Norway	Intergenerational engagements in the Philippines
Gaining access	Partnership with a non-government organization Livsglede for Eldre Online recruitment through a public Facebook post in Barnkunne page	Self-selecting participants: used social media platforms to gain participants who would volunteer
Methods	Online form co-created with Livsglede for eldre staff Online focus group discussion	Online form for self-selecting participants Participant-generated visual materials Online Pakikipagkwentuhan (since normally pakikipagkwentuhan is done in person)

18.7 Conclusion: Some Reflections

Marianne Hedegaard sated that:

children's formation as persons is connected to their social situations that change through their life course, depending on the institutional practices they participate in, and thereby their opportunities to acquire motives, social competence, thinking and conceptual skills. (Hedegaard, 2019, p. 1)

I argue that it is the same for adults, for PhD candidates, for researchers. The pandemic showed us just how our social conditions force us to develop as individuals—ones who can make pivots and think out of the box. We have been given an opportunity to be resilient and persevere. However, beyond resilience, which is a concept often romanticized when looking at an individual, I would like to believe that my success is a systemic process of institutional and personal support. I could never have thrived if I was not in an environment where I was too restricted.

As a conclusion, I offer some reflections that I hope would provide additional insights to readers of this book:

1. Innovation leans on existing networks (many of which already were digital)
As mentioned, it would not have been possible to continue without the help, encouragement and support of other people—both physically and digitally. To me, researchers are most resilient, creative and resourceful when they have supportive environments where they are encouraged to try new ideas. This of course means being allowed to fail, but also being allowed to learn from failures—especially during the time when a lot was unknown and unsure.
2. Crisis as making the dialectic nature of research more transparent.
In addition, the research process, as in this case, is necessarily relational and dialectical in nature—very much anchoring on socio-cultural and cultural-historical perspectives where persons are intertwined within their environments where time and events are relevant. In this sense, the research process, the researcher as well as the phenomenon being studied is always in a transitionary and transformative state as change is constant with time.
3. Having had institutional support was also key to being able to pivot the way I have. The flexible and supportive nature of institutional practices of the time enabled me to be confident in following through my actions.
4. Pivoting to online data gathering saved me so I am thankful. It allowed me to show my skills as a developing researcher. However, there are limitations that must be recognized—the ability to participate, access to participation, the invisible or not reachable, unheard voices: The participants who have given consent to participate in this research have chosen to show what could be viewed as normative, middle-class culture intergenerational engagements and practices during the time of a pandemic, where resources and materials are more readily available to young children and their grandparents. As such, these case studies can also point to the apparent lack of representation of non-normative intergenerational engagements where more complex challenges such as extreme poverty,

physical or mental illness, family violence, parent separation, etc. are interspersed with the challenges of the ongoing pandemic. While this is something that is seemingly unrepresented in the two case studies, this research sets groundwork for possible future research to include intergenerational research in different contexts. Hence, we can also think of ways of how it will be possible for their voices to be heard, for their lived experiences to be represented, documented and included, for their materiality to be improved, and for intergenerational research to work with them.

5. Some of the data the participants provided in the form of written narratives, videos and photos gave visual snippets of intergenerational engagements, in the family context, during an ongoing pandemic. These were pre-filtered by parents and provided single camera point of view. In addition, the video clips were short. In some clips, they do not include full dialogues/ conversations between younger children and older adults. The longest video clip was 1 min and 18 seconds. Above all, the actors were aware of the documentation. As such, there is a need to see beyond the visual data generated. As researchers, we need to ask «why are we seeing what we are seeing?»

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Chapter 19

Data Sharing Is Caring: Crisis-Induced Realisation of Open Access Policy in a PhD Project on Food Practices



Baizhen Ciren 

Abstract Cross-cultural and comparative research is becoming increasingly relevant in the field of food studies. However, the COVID-19 pandemic made travel and research visits impossible. The European Union (Berlin Declaration. Berlin declaration on open access to knowledge in the sciences and humanities. Retrieved from https://openaccess.mpg.de/67605/berlin_declaration_engl.pdf, 2003) has long postulated the necessity of research data sharing and preventing data waste. Using the cultural-historical wholeness approach to reflect on the example of the methods employed by a comparative PhD project on kindergarten lunch practices in Norway and China, this chapter shows how the crisis of the impossibility of directly conducting research (due to the outbreak of the pandemic) activated the data-sharing policy. This chapter argues that with careful consideration of epistemological, ethical, and methodological issues, data sharing in qualitative research can be beneficial for researchers, the scholarly community and the public and can help promote a research culture of sustainability in the long run.

Keywords Comparative research · Data reuse · Goals and motives · Lunch practices in kindergartens

19.1 Introduction

Cross-cultural and comparative research is becoming increasingly relevant in the field of food studies, within which both local and global influences are apparent (Curtis, 2012; Niva et al., 2014; Oostindjer et al., 2017). What and how food is served in educational institutions in different countries and cultures yields

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important information on the historical contexts, social structures, cultural values and current trends in a given society (Golden, 2005; Kjørholt et al., 2005; Allison, 2018). Previous studies have suggested that, by identifying similarities and differences across cultures, a better understanding of the factors influencing current eating patterns and health outcomes can be achieved and can inform the development of interventions to promote better health in the future (Estima et al., 2014; Thi et al., 2019).

Although it is beneficial for both academics and practitioners to collaborate on research across different cultures and/or countries (Phillips & Schweisfurth, 2014), the global coronavirus disease 2019 (COVID-19) pandemic limited opportunities for doing this using the traditional form of fieldwork research (Tarrant & Hughes, 2020). With the development of digital technology and the open data movement (Leonelli et al., 2015), sharing of research data has been made possible in practice (Zhu, 2020). Notably, the European Union (Berlin Declaration, 2003) has postulated the necessity of research data sharing and preventing data waste. Data reuse is envisioned to enable new intellectual possibilities for already collected data, exponentially increasing the return on the time, effort and money invested in any given dataset (Logan et al., 2021). Over the last two decades, there has also been tremendous innovation in wide-ranging methods of reusing qualitative data, which are not only important documents of human life but are also creative resources relating people with the social contexts and histories of which they are part (Tarrant & Hughes, 2020). According to Jones et al. (2018), the benefits of reusing qualitative data can be sorted into three categories: scientific, descriptive and material (Jones et al., 2018). The considerable advantages of reusing qualitative data as a way to ‘scale up the findings and extract greater value from the material, and potentially extend the reach and impact of qualitative studies’ (p. 413) were also highlighted by Valentine (2006). In pursuing questions related to how qualitative data should be re-approached, Hughes et al. (2020) suggested moving away from a binary distinction between primary and secondary data and their analyses and instead considering how these data are apprehended by researchers.

Data sharing, which has a massive potential for generating new knowledge, is less commonly practiced in the social sciences, especially within qualitative research paradigms, than in the biomedical and natural sciences (Jarolimkova & Drobikova, 2018). Some major factors inhibiting data sharing in qualitative research are ethical issues related to human participant protection and privacy (Kirilova & Karcher, 2017) and epistemological and methodological challenges (Irwin & Winterton, 2012; Jones et al., 2018). This chapter presents the intentions, planning and practices of reusing qualitative interview data during the global COVID-19 pandemic—an adaptation strategy that worked for my PhD project. By sharing my experiences of shifting towards such a method, I demonstrate the importance of adaptation in research and the value of qualitative data sharing during a crisis.

The chapter first presents a pictorially depicted DNA metaphor representing the context in which the researcher decided to reuse a set of qualitative interview data collected by the researcher’s supervisor from a group of Chinese kindergarten delegates. Then, it discusses the rationale for reusing the materials gathered in a study

with a different goal and set of research questions. By demonstrating adaptability to changes in research design during a crisis, this study may inspire creative solutions for future scholars facing similar challenges.

19.2 Stuck in Norway During the COVID-19 Pandemic

The global COVID-19 pandemic had a somewhat detrimental impact on my PhD research project, which was a cross-cultural study of food and meals in Norwegian and Chinese kindergartens. Due to international travel bans and the imposition of lockdowns, I could not collect data in China. When the pandemic hit, I was about to finish my data collection in Norway and was planning the logistics of my Chinese data gathering. However, with extended travel restrictions and based on governmental and institutional advice, my trip to China was postponed. As the pandemic dragged on, my rescheduled trips also did not push through. This process of rescheduling slowed down my research work by several months, and I knew I would not be headed to China any time soon. Thus, I began thinking about making changes and adjustments to my research work to be able to finish my PhD on time.

19.3 A Metaphor: The DNA Model

The DNA model simply represents a point of departure for me. It is an attempt to show the complex and dynamic reality of my research data-gathering experiences during the COVID-19 pandemic, which led to adaptive changes in the research design of my PhD project. This model relies on Leontiev's (1978) views regarding motives and activities. According to him, 'an activity does not exist without a motive' and 'the actions that realise activity are aroused by its motive but appear to be directed toward a goal' (p. 63). In other words, an activity is performed because of a motive, and both the motive and the goal direct the activity. Hedegaard (2008, 2009) extended Leontiev's conception of activity in her cultural-historical theory, in which the concept of institutional practices was proposed. In Hedegaard's opinion, institutional practices provide the frames of activities. That is, an individual's activity is situated within the institutional cultural frame, and the individual acts within the system of the institutional culture, which reflects the demands of the broader society they are a part of. The idea of motives and goals had practical implications for my reflection on and analysis of the trajectories of my PhD project design during the pandemic, which I further elaborated on and developed through a visual metaphor inspired by the DNA model (see Fig. 19.1).

A DNA molecule consists of two strands that form a double-helix structure. As illustrated in Fig. 19.1, the two twisted strands represent motives and goals constituting the complex trajectory of my PhD project design. Specifically, in my case, my motive of continuing my PhD research on cross-cultural studies of food practices in



Fig. 19.1 The double-helix of goals and motives constituting trajectory of a research project

Norwegian and Chinese kindergartens served as a drive for my adaptations. My goal was to gather data from both countries to understand the rationales, conditions and thinking behind food practices. To attain my motive and goal, I needed to perform actions to navigate my research work during the pandemic. I decided to explore new directions in research methods, especially from the Chinese side.

In the DNA model, the two strands are stuck together to create a ladder-like shape. Within the ladder are four bases (A, T, C, G) representing the ‘rungs’, which make the double helix stable. The four bases are the ‘letters’ that make up the genetic code of the DNA. In my model, the four bases, representing actions, tools, conditions and ground plan or methods, are the decisions and moves I had to make to actualise my motive and goal. These four concepts were borrowed from Dalsgaard’s (2020) conceptualisation of levels of human activity in his framework for learning and reflection, developed based on Engeström’s (2015) activity theory. According to Dalsgaard (2020), motives and goals, based on conditions, are mediated by instruments, such as methods and tools, and are performed for actions. Without going into further detail about Dalsgaard’s (2020) explanations of the process at different levels of learning, I found his concepts helpful because they guided me in generating research data during the COVID-19 pandemic. Specifically, the action I took was to reuse qualitative interview data collected by my supervisor with careful consideration and assessment of the conditions within which the data were embedded. Moreover, I used Hedegaard’s cultural-historical wholeness approach as a methodological and analytical tool to interpret the data, which offered unique opportunities and a new way to conceptualise existing material and contribute to my PhD progress.

While I was situating the activity of data reuse around my motive and goal of continuation, Hedegaard’s cultural-historical approach (2009, 2012) enabled me to engage in holistic thinking regarding the institutional and societal conditions within which my personal stories were placed and emerged. At the institutional level, following the Norwegian National Strategy on Access to and Sharing of Research Data (Norwegian Ministry of Education, 2018), data sharing is encouraged as an institutional search and strategy for new practices/activity settings, allowing the university to continue the planned research activities regardless of the COVID-19 crisis. Therefore, I acknowledged that my motives and actions were backed by institutional enabling conditions and emanated from the broader context beyond my own stories and engagement.

19.4 The Rationale for Data Sharing

As pointed out by Pearce and Smith (2011), the issues of data sharing are highly specific to each study, the nature of the data collected, who is requesting the data and what they intend to do with them. Therefore, it requires thorough articulations about the process and must be represented in all its richness. In the following paragraph, I provide the rationale for adopting data sharing in my research project and then explain why it was possible for me to reuse data in the context of my research project.

First, I believe that the nature of the data that I collected largely made it easier for me to obtain and use them ethically. The data were a set of recorded anonymised interview data regarding food practices in the participants' kindergartens and their experiences in a two-week knowledge exchange programme in Norway. I presume that anonymisation made the data less sensitive and confidential than, for instance, analyses of potentially identifiable health information. Second, one of the goals of my PhD research project was to understand the conditions and institutional food practices in Chinese kindergartens, and the existing data had the potential to achieve this objective. Third, the research participants consented to my use of the data obtained from them in a former study in the larger research project I was a member of, which made my analyses of their data possible. Although obtaining prior informed consent from the participants does not mean that the ethical problem is fully solved, it is an essential aspect of the research relationship. Fourth, my collaboration with the original data collector (my supervisor) allowed me to better understand the original research project and the context within which it was conducted.

19.5 Orienting Myself to the Interview Dataset

An in-depth understanding of the origins of data reuse has been highlighted in previous research (Poth, 2019; Koesten et al., 2021). Coltart et al. (2013) indicated that the researchers' 'close ties to the [origin] project and one another have proven to be incredibly valuable in terms of providing checks and balances against misinterpretation' (p. 282). The data that I reused in my study originated from a study on a programme aiming to promote the existing collaboration in early childhood education in Norway and China and teachers' professional development (Birkeland, 2015; Birkeland & Li, 2019). The programme involved provincial and local officials and kindergarten principals from three Chinese cities, and the participants attended various activities (e.g. seminars and observations) in Norwegian kindergartens for 2 weeks. The interview data collected by my supervisor described the participants' perceptions of this programme after observing Norwegian kindergarten meals and their experiences with food practices in China, especially concerning growing vegetables and preventing obesity. A significant part of the interview data was on the

food practices in Chinese kindergartens, consisting of the participants' detailed descriptions of their food practices, which, in many ways, aligned with my research questions.

Although it was invaluable that parts of the data generated answered my research questions, there were clearly some challenges. For a consistent critical analysis of what the data entailed, I constantly reminded myself of how the interview data were generated, and I viewed the researcher–participant relationship as being critical in structuring the participants' responses to the questions asked. It was important for me to understand how the participants were oriented to the original research project (for example, if I had the opportunity to conduct the interviews myself for my research project with my research objectives, the participants might have oriented themselves differently to the project; thus, they could have worded and structured their responses differently). Furthermore, the background of the interview participants (leaders at different levels of Chinese early childhood education and care) and the fact that they had travelled to the kindergartens participating in the programme and reflected on the practices in their own, could have significantly impacted what they shared in the interviews and how they shared it. Engaging in such thinking throughout my data analysis and interpretation made me aware of the demands for transparency in my presentation.

Although it is important to be transparent about the process of reusing a dataset, there are other challenges that must be tackled when working with a secondary dataset. Many of these challenges concern the integration of theoretical and empirical work. To address these challenges, I adopted what I call a 'sense-making' strategy in my analysis, in which I used an inductive-deductive method connected to conceptual and theoretical knowledge rooted in cultural-historical conceptions and the broader society. Specifically, to capture a holistic picture of the data, I examined the data—outwardly, towards Hedegaard's cultural-historical wholeness approach, and inwardly, departing from Hedegaard's approach and going towards the interview data—to identify theoretically interesting concepts in greater detail. This worked well in my study. It enabled me to broaden my perspectives by looking into historical developments, cultural conditions and relational factors when interpreting the data.

19.6 Conclusion

In this chapter, I present a pictorially depicted DNA metaphor representing the context within which I decided to reuse a secondary interview dataset in my PhD research project. By explaining the rationales, thinking and strategies of managing secondary data and how I methodologically arrived at my data interpretation and thus enhanced the quality of my data analysis, I demonstrated that it is possible and valuable to reuse qualitative interview data in the era of electronic records. I hope that this study will inspire future scholars and the public to embrace and promote a research culture of sustainability in the long run.

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Part V
Resilient Digital Agility—Professionals
Navigating a Crisis

Chapter 20

Theorization on the Nexus of Crisis, Resilience, and Digital Agility



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Abstract This section introduction will study the nexus of crisis, resilience, and digital agility, drawing on the knowledge from the section paper. The concepts of resilience and agility are both social and personal. We lean on Dafermos (Rethinking cultural-historical theory: a dialectical perspective to Vygotsky. Springer, Singapore, 2018), who, with reference to Vygotsky’s research, stated that the underestimation of the problem of personality was one of the basic shortcomings of his own research program. This section increases our theoretical understanding of the ways in which the personal (motivation, traits, e.g. engagement, and capabilities in individuals), institutional, and societal are entwined. We sum up the metaknowledge of the chapters by presenting a model pinpointing *Resilient Digital Agility* with three crucial actions; *recover, respond, reimagine and recraft*.

Keywords Digital agility · Resilience · Reimagine · Recraft

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20.1 Introduction

Faced with the current spectrum of global crises, Anna Stetsenko invites the cultural-historical society to a broadened perspective (Stetsenko, 2021). She states that it is impossible to describe the crisis that we now face in great detail as it is multifaceted and poly-dimensional. Addressing this socio-political crisis, however, is a key to understanding the deep mechanisms of any science or research direction.

... science is always and inherently (through and through, in all its elements and dimensions, socio-politically saturated, historically situated, culturally specific, and, therefore, also and inevitably, ethically responsive and responsible. (Stetsenko, 2021, p. 4)

This reminder sets the scene for this section, which focuses on crisis from the viewpoint of the early childhood education professions and their collaborators, including children, families, staff, students, and researchers. We ground our theoretical efforts in cultural-historical perspectives through the construction of a conceptual model in which resilience is a dynamic force found in individuals and nurtured in cultures that can support a responsive, responsible procedure for crisis navigation. Following a cultural historical approach, we are considering both societal, institutional and personal aspect (Hedegaard & Fleer, 2008).

This section will study the nexus of crisis, resilience, and digital agility. The concepts of resilience and agility are both social and personal. According to Dafermos, Vygotsky explicitly stated that the underestimation of the problem of personality was one of the basic shortcomings of his own research program. This problem of personality is a complex issue that Vygotsky proposed to include in his own research agenda (Dafermos, 2018). This section will increase our theoretical understanding of the ways in which the personal (motivation, traits, e.g. engagement, and capabilities in individuals), institutional, and societal are intertwined.

Vygotsky uses of the concept of crisis when referring to the specific mechanisms in human psychological development. Moreover, we expand the concept of crisis using a wider contextual perspective, defining it as a critical moment that needs to be ethically responsive and responsible, as pointed to by Mikhail Bakhtin. In doing this, we lean on Manolis Dafermos's (2022) outlines of the concept of crisis as a dynamic, contradictory, developmental process. This concept enables us to contribute to further actualizing the concept for our time by reviewing cultural-historical research (Dafermos, 2022).

Part V offers examples of how researchers and teacher educators responded to the sudden disruption of collaboration and communication that occurred when the Covid-19 crisis put early childhood educational institutions in an unpredictable situation. We attempt to bridge this gap with regard to the formation of the characteristic of resilience. We postulate that teachers who are particularly resilient in the face of crisis, may have greater digital agility.

The examples are written in the context of the Norwegian Covid-19 crisis, involving collaborators from China and the USA. Norway is a privileged global northern context; in such a context, participants easily take the welfare state for granted, which ensures that every citizen has access to public healthcare.

During the Covid-19 pandemic, trust to authorities and institutions was identified as a key factor for dealing with crises such as the pandemic control. Norway and Finland were internationally identified as two best-practice examples. A high-trust society that utilises caring economics as a deep anchoring of trust and integrity was seen in both countries. It is also worth noting that ‘Dugnad/dugnadsånd’, which refers to the *collective effort for common good*, is a trust-based Norwegian mentality that has been used to explain mechanisms of pandemic control (Hedenigg, 2021). In this context and given the availability of digital technology, participants could reach out to local regional collaborators as well as collaborators in China and the USA with access to digital communication platforms.

A mentality of ‘dugnad’ could be related to *resilience*. How a profession, such as the early childhood education sector, reacts to a crisis can be chocked up to either individuals or the collective, societal preparedness for crises. A study of societal preparedness for emergencies and crises showed a strong correlation between high levels of trust in authorities and resilience and preparedness for crises; Norway is of two countries with the highest scores of resilience and preparedness for crisis (Hedenigg, 2021).

Even when overall societal examinations indicate high levels of resilience, a crisis will always be demanding. The early childhood education sector is a first line service and provides crucial services for the public in times of crises; studies have shown that the pandemic was demanding on the staff in the early years sector and both exacerbated old problems and inspired new energy for creativity and problem solving.

In this section, we aim to explore, from a theoretical point of view and through the construction of a conceptual model, how crisis interacts with resilience and agility to help revitalize and ground a model-building effort such that digital agility is seen as a cultural-historical activity that allows professionals to transform and expand their methods of collaboration with academic and professional partners, early childhood teacher education students, and children. Therefore, we defined ‘digital agility’ as a characteristic of the interdisciplinary professional teams involved in the research in this section. Our theoretical contribution will be found through a metanalysis of the chapters in this section.

20.2 A Starting Point for the Conceptualisation of the Nexus of Crisis, Resilience, and Agility

The concept of a crisis is not often conceptualized, as seen in recent studies of the effects of the pandemic on early childhood research, (Bussey et al., 2022; Pramling Samuelsson et al., 2020; Weiland & Morris, 2022). Vygotsky provides an explanatory cause of the crisis in psychology. He claims that crisis does not occur when there is a disagreement between new facts and the ruling structure of knowledge, as seen in, for example, Thomas Kuhn’s famous explanations of crisis in science.

While Kuhn explained that a scientific crisis occurs when the dominant “paradigm” fails to explain new facts and irregularities have been going on for a period of time (Wray, 2021), Vygotsky argued that a crisis occurs when the development of applied investigations connects with new types of social practice (Zavershneva, 2012). Demands and expectations can be of ‘a stormy, impetuous, and sometimes catastrophic character that resembles a revolutionary course of events (Rieber & Hall, 1998). Nevertheless crisis, being of dialectic character, can take a route from ‘the storm’ to a formative course of creativity, which is of central character when understanding crisis and historical times following a crisis and times to come.

Manolis Dafermos provides a historization of the concept of a crisis and suggests that it is a key concept for both modernity and post-modernity, as the concept challenges understanding of history. Experiencing crises undermines the model of time and the modern idea of history as a gradual, linear, and cumulative progress. Also, the understanding of history coming from an ancient or cyclic understanding are challenged. The word crisis has various meanings, including: (1) a ‘chain of events leading to a climaxing, decisive point at which action is required’, (2) ‘...a unique and final point, after which the quality of history will be changed forever’ and (3) ‘a critical situation which may constantly recur or else to situations in which decisions have momentous (Dafermos, 2022). Dafermos summarises that a crisis, from a dialectical perspective, is a critical moment of a dynamic, contradictory, developmental process, and that this is particularly of interest when regenerating cultural historical theory.

Also, the role of leadership during crisis can be noteworthy in terms of understanding how teachers can show and build collective resilience, as seen in other chapters in this section. However, leadership can also fail when the culture does not back them up during a crisis (Joseph et al., 2022).

Problems can be either easy fixes or long-time, life-threatening issues. Problems, whether in our private or professional lives, are normal; even if you break your leg, it is no immediate crisis, as long as you live in a country that is in a time of peace and has a welfare system. You will then get help and support from the hospital and, in recovery, when entering public life on a pair of crutches, people will offer you their seat on the bus and open doors for you in the workplace. This mentality is known as *caring economics* (Hedenigg, 2019), which involves the embedding of socio-economic and ecological solutions into the concept; partnership and collaboration are crucial (Eisler, 2007).

The far more serious problems are the ones that societies take decades to overcome, like poverty, climate change, and war. These problems are continuous crises, which either have no clear solutions or are difficult to solve because of contradictory interests and confusing information, or where involve many clients and decision-makers with conflicting values such that the ramifications in the whole system are thoroughly difficult (Earle & Leyva-de la Hiz, 2021; Ødegaard, 2023).

Both continuous problems and sudden crises will provide professionals with extraordinary challenges; emotions will be triggered when sudden disruptions and constraints to private lives and professional tasks are experienced. The ways in

which people respond to crises depends on personality in addition to the societal and institutional conditions mentioned above.

To understand crises, as critical moments, often contradictory processes, are challenging the view of development as linear and universal steps. Here, a crisis is understood as a series of dynamics with an uncertain outcome. Finding oneself in a crisis with no obvious happy ending triggers novel thinking and new practices. As a response to the need for rapid changes when living in the midst of a crisis, the introduction to Part V will theorise what these chapters describe, namely a digitally agile professional practice as a response to the sudden constraints caused by crises like the Covid-19 pandemic.

For our purpose, it is of interest to examine recent research on the resilience of children's and their teachers' lives in times of crisis. Resilience is considered the safeguarding of positive adjustment under challenging conditions. Our approach for understanding the mechanisms in professional lives is the cultural-historical approach, which has been embraced by both the Vygotskian dialectical and the Bakhtian polyvocal to understand and describe digital agility during the pandemic. Also, the cultural historical activity theory (CHAT) approach is utilised to theorize a design for the use of VR, where adult students motivation' is at stake. These cultural-historical theories share a common ontological base; cultural-historical concepts are foundational to the key themes of professional pedagogy. Dialectic is central to the works of Hegel and key to understanding how transformation occurs in processes of contradiction and the complexities of both material and relational conditions (Fleer & Veresov, 2018; Ødegaard & Borgen, 2020). The way that development will occur is defined by a range of historical activities, units, and relations; Vygotsky claims that development is an ongoing process, "which feeds upon itself," (Vygotsky et al., 1993). The role of the structural, social, and material environment is central to cultural-historical theory. However, in our context of a pandemic crisis, adding biological conditions into the complex matrix is necessary to fully understand the problems, development, transformations, and solutions brought up in this section.

It is important to understand how groups of early childhood professionals develop what we can call *Collective Resilience*, the social bonds that connect people and facilitate recovery and coping (Glynn, 2021). There are several aspects of collective resilience. In a crisis situation, the professional staff must realise their vulnerability and be open to new ways of working. Early childhood professionals have a long-standing tradition of collaboration, and there must be a preference for collaboration in order to achieve collective resilience. The ability to use different competences and to improvise is also important. All of these factors open the floor to collaborative exploration as an important trait for early childhood professionals (Ødegaard, 2021). There is also the trait of agility, defined here as the ability and power to act fearlessly and fast in cases of disruption. Early childhood educators must trust that failure is not a catastrophe.

Digital agility is the ability to move easily and quickly by leveraging digital technology and solutions. As researchers, this has evolved as access to literature through search engines and the internet has become easier. The professionals are not

to the same extent been using digital platform across institutions. The use of the internet and of digital media in general is most often connected to digital competence, not digital agility, and reflects a person's ability to be outward-looking and adaptable to a changing world (Kucirkova & Quinlan, 2017).

The concept of agility and the dynamics of agile coping derives from positive psychology. However, other theoretical lenses have been added to better explain the multilevel contextual nature of agile coping in the digital workplace (Ferreira et al., 2021). Agility as a concept connects to other factors that are essential to wellbeing. Positive emotions, like engagement, meaning-making, relationships, and accomplishment, will ground the ability to move quickly to find new solutions. Agility also connects to the influence of cultural-historical approaches and studies of everyday life in institutional worlds.

Change and transformation are familiar concepts in cultural historical theory; in this introduction, we elaborate on the concept of digitalization in the context of the ECE professions, viewing it as a process involving transformation on several levels, including personal, institutional, and cultural (Hedegaard & Fleer, 2008). An explorative mindset, which will be a driver for a resilient digital agility, is theorised within a cultural historical paradigm. An educational culture encouraging resilience and digital agility will be better able to deal with uncertainty and embrace different kinds of knowledges (Ødegaard, 2020, p. 96).

20.3 Resilient Digital Agility at Work—Four Examples

In Chap. 21, *Resilience in partnership research—using digital platforms in the co-creation of knowledge in pandemic times*, written by Johanna Birkeland, Elin Eriksen Ødegaard, & Marion Oen, the concept of *collective resilience* drives the analysis. They introduce the notion that, from a cultural-historical perspective, resilience can be understood as a higher psychological function resulting from collaborative and collective processes (Wertsch, 1993, 2002).

The problem in their study was that the two partner institutions had different digital platforms, regulations and working cultures. They needed to find a common digital tool across institutions in order to communicate effectively and find new meaning in the crisis. The authors describe how the partners responded quickly and managed to work across institutional borders in attempts to recreate tasks.

The response was to use a common digital platform to write in order to share and inspire each other. Resilience is considered the safeguarding of positive adjustment under challenging conditions and was identified as a strong motivation to write success stories about how they changed their practices. Meaning making is central to resilience, as it determines how we find positive meaning in the midst of a crisis. They use the concept of *collective resilience* (Glynn, 2021) to describe and analyse how resilience occurred between institutions, strengthened an interdisciplinary project to a community mentality, and reinforced individuals such that writing about problems, crisis and the turn towards success, developed in the process.

Chapter 22 of *PLUM—SKUM—The making of a video of washing hands with the youngest children after the outbreak of Covid-19*, written by Elin Eriksen Ødegaard and Håkon Hoffart, describes a collaborative and interdisciplinary process across countries and generations. Informing children of the importance of washing one's hands became common during the early days of the pandemic, yet the information was almost exclusively delivered either in a manner best suited to ages four and up, at a time in their development when children were incapable of understanding and obeying complicated oral messages. The authors identified a lack of developmental knowledge and awareness regarding successful communication with children. Although older children might follow the commands of adults regarding infection control, younger children lack the logical tools to process such information. Ultimately, the authors were critical of the information and tool kits provided to kindergarten students for several reasons; on this basis, they created a 90 s video targeting the youngest children with, more imaginative language.

This chapter narrates the process of creating a video targeting the youngest children using cultural-historical and aesthetic analytic models and concepts, where play and imagination are crucial concepts. The design was participatory, as the process involved ongoing dialogue between the researcher, the artist, a family with children 2- and 4-year-olds, kindergarten teachers, and children in three groups (aged 1–3-year-olds). The result was a colourful, abstract cartoon language with stimulating rhythms. This chapter demonstrates how information regarding infection control was recrafted on the principles of attraction and play imagination. The crafting of the video was a response to the national health and education authorities' efforts to effectively communicate information regarding infection control when reopening kindergartens and schools after the lockdown.

In Chap. 23, *VR technology in an engaging kindergarten teacher education*, written by Niels Christian Tveiterås and Thomas Bjørner, the authors explore the questions of how Virtual Reality (VR) can play a part in students' learning in the context of the pandemic. They point out that, before one can investigate if and how VR influences learning, students and teachers must be willing and motivated to use it.

In their chapter, they reckon with the problem of motivation by narrowing the focus down to factors that can impact willingness to utilize a new technology like VR. Using the CHAT theory in addition to Vygotsky's theory of cultural mediation and Leontiev's collective model, the activities in question involve subjects working toward achieving outcomes through mediated action (Vygotskij & Cole, 1978). Their VR engagement model, alongside Engeström's CHAT model, shows how digital competence is engrained with engagement, flow, and motivation. Focus the importance of motivation to use new digital equipment can set off a series of processes for teachers to consider; for example, planning for responsive actions when crises occur in order to enable rapid recoveries. 'Forward anchoring', as proposed by the CHAT model, will support the didactic planning regarding how to best respond with agility and resilience.

Aihua Hu and Åsta Birkeland implemented an international collaboration project across the borders of China and Norway, involving researchers and practitioners in a neighbourhood project, in Chap. 24. When Covid-19 severely limited international mobility and face-to-face meetings became impossible, the partners met this problem with a rapid recovery. They sustained the project in ways that showed creativity and resilience. To keep the collaboration going as planned, they utilised digital platforms to conduct workshops. They continued to share information and facilitated communication through both more traditional and more established methods. This practice proved to enable a closer relationship between ongoing professional development and research on education for sustainability; this demanded the recrafting of elements of the project. In their chapter, they discuss how this cross-cultural collaboration worked through digitalization. This chapter describes lessons learnt from a series of digital workshops. Of special interest is the explorative approach on how to collectively analyse the digitally collected data. The participants figured out how the data and analysis could inform further improvement of practice. This demanded a reimagining of the context in which the project should unfold.

20.4 Respond, Recover, Reimagine, and Recraft—Four Characteristics of Resilient Digital Agility

In sum, we found that:

Cases	Crisis as a problem	Digital response as new opportunity
C23 Partnership research	Disruption of communication across different digital platforms	Rapid response and recovery by choosing one common digital platform and starting to explore and share writing in new genres
C24 Washing hands	Lack of age-appropriate communication	Rapid response by reimagining the sensual and exploratory life of 2-year-olds and recraft a video via intergenerational collaboration
C25 Virtual reality	Problem of motivation	Reimagining digital competence through the CHAT model to find motivation engrained with engagement and flow for the use of crafting a foresighted research design that is tailored for crisis recovery
C26 Neighbourhood	Stop in mobility	Rapid response and recovery through the use of digital workshops and collectively analyses of the digitally collected data.

To help strengthen and ground our model-building efforts, we present the following figure based on the short analysis of the four cases.

Model—Resilient Digital Agility



20.5 Conclusion

The professional teams referred to in this section navigated crises with digital agility. Supported by the concept of crises from a cultural-historical perspective, the dialectic deriving from a crisis, elicit a range of practices, some of which is creative and innovative. In this section we introduce a key set of strategically agile processes, enabled by digitalisation, created collective and strategic resilience. The main principles derived from the chapter descriptions can be seen in the key verbs *respond*, *recover*, *reimagine*, and *recraft*. To be able to respond, recover, reimagine, and recraft after a crisis, professionals must first navigate it. They will need to act fast, meet challenges with a new perspective, and focus on collaboration while allowing missteps and further exploration.

We saw in the first four chapters that the pandemic actualized abilities like digital agility. After summing up on the professionals' experiences and activities, triggered by the pandemic, we could see the importance of the ability to identify, respond, adapt, learn, and recover as conditions change. We also saw the importance of re-imagining and re-crafting, capabilities that can be employed not only in a crisis, but at all times.

Digital agility is an important characteristic that should be recognized by institutions and across partner institutions. Our examples show that maintaining collaboration and professional development requires digital agility on a personal, professional, and institutional level across institutions and across national lines. One should embrace models that integrate larger ecosystems as disruptive changes often alter both relationships and activities. A digitally agile early year professional is responsive and primed to focus on the best interests of the children in their care as well as their families and other staff.

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Chapter 21

Resilience in Partnership Research—The Role of Digital Platforms in the Co-creation of Knowledge in Pandemic Times



Elin Eriksen Ødegaard , Johanna Birkeland, and Marion Oen 

Abstract The purpose of this chapter is to narrate and conceptualise the changing processes that occurred when an interdisciplinary team transitioned from face-to-face workshops to a shared digital platform space in a historical time of crisis. The chapter describes how an interdisciplinary partnership project overcame obstacles, such as the respective institutions using different communication systems, to explore possibilities for partnership research through using a common digital platform as a tool for collective writing and for experimenting with writing genres. Inspired by cultural-historical theorisations of collective resilience, we describe how team members reinforced each other to strengthen risk situations, overcome them and use them as sources to support joint development of practices and co-research. We call this *collective resilient digital agility*. According to a cultural-historical perspective, resilience can be understood as a higher psychological function resulting from collaborative processes (Wertsch JV. Vygotsky and the social formation of mind. Harvard University Press. <https://doi.org/10.2307/j.ctv26071b0>, 1988). The results show that the pandemic and the shift to using a new artefact, a digital platform, changed what it was possible to do, strengthening resilience and ways of working together and opening up a co-creative writing genre.

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Keywords Interdisciplinary partnership · Collective resilient digital agility · EX-PED-LAB · Digital platforms

21.1 Introduction

This chapter analyses and describes obstacles, experimenting with and changing processes in an interdisciplinary partnership project and proposes the concept of *collective resilient digital agility* to describe these processes. While *resilient agility* is a novel concept (Prieto & Talukder, 2023) used in workplaces to describe individuals' and organisations' rapid change towards new digital solutions, less studied and conceptualised is how interdisciplinary teams crossing the borders of sectors such as the early childhood sector, both kindergarten staff and the staff of municipality agencies and researchers at university, respond rapidly in times of crisis. The study narrated and theorised in this chapter involved four early childhood education and care (ECEC) institutions in Norway, called kindergartens, representatives from the ECEC institutional authorities in the city of Bergen, Norway (the ECEC agency) and researchers at the KINDknow Research Centre at Western Norway University of Applied Sciences.

During what was considered a crisis, the Covid-19 pandemic, the interdisciplinary team had the experience that after all activities and collaborations were first closed, the team started to solve problems. In the retrospect, one can see that resilience arose among the participants. In what were considered challenging times for all citizens and especially frontline workers, such as kindergarten staff, and by researchers with designs that required being alongside children and staff in everyday life, new sustainable practices for partnerships across sectors developed.

The study is a response to the problem of a low degree of interdisciplinarity and collaborative practices, especially across academic and societal stakeholders (Ministry of Education & Research, 2020). The benefits of interdisciplinary collaborations have been recognised both professionally and politically (Bærheim et al., 2022; Kemmis et al., 2013; Wallerstedt et al., 2023). Despite a high understanding of the purpose of such partnerships, few comprehensive empirical studies have been conducted at the micro level, where core local stakeholders in the ECEC field work together to co-create new relevant knowledge, and few studies have reported on the role of digital platforms as a tool for strengthening resilience in the ECEC sector and their partnerships with researchers.

When the pandemic crisis closed off every possibility to meet in person, this interdisciplinary team explored possibilities for continuing the partnership research, overcoming obstacles, such as the respective institutions using different brands of communication systems, by using one common digital platform as a tool for

collective writing. Sectors such as municipalities and universities will have different mandates, communication systems and logics to achieve work tasks. While, at a policy level, sectors are encouraged to collaborate across sectors and organisations, these organisations are not set up for interdisciplinary collaboration at a systemic level. As organisations operate as separate units at the systemic level, being able to work together as partners, crossing organisational borders, is not straightforward. At a policy level, we are reminded of the relevance of interdisciplinary collaboration, and while engaging in it, we all experienced the benefits of understanding problems in depth and found it rewarding to collaborate. Such cross-sector partnerships, however, require extra effort. Since the participants need to understand more, not only their own areas of practice, but also those of their partners, they will need to establish a common agreement, often called the third space (Martin et al., 2011), to achieve success in their shared endeavours.

A premise for this inquiry was that resilience needs to be collaborative as a prerequisite for operationalising resilience in ECEC. As particular dynamics of collaborative working and the co-creation of knowledge are likely to promote resilience, there is a need to explore the underlying collaborative mechanisms through which processes of collective resilience occur and, more specifically, the processes facilitated through digital tools, such as digital platforms.

Based on the final theoretical positions of Vygotsky and other Soviet authors and researchers further developing this legacy internationally, attention and new conceptualisations have been given (Edwards, 2005; Fleer et al., 2021; Gonzalez Rey, 2015; Hedegaard et al., 2012). Research in this tradition defines motives on a scale from a specific quality of subjectively shaped systems, where motive is a process of subjective configuration (Gonzalez Rey, 2015), to positions where motives are defined as mediators between society and the person involved (Edwards, 2005; Hedegaard et al., 2012) and defined as a formative process, ingrained in time, space, relation and artefact, involving body and language (i. e. discursive practices) (Ødegaard, 2015, 2021a, 2023).

The purpose of this chapter is to outline, narrate and conceptualise how interdisciplinary teams and a tool, a digital platform, strengthened collective resilience for the co-creation of knowledge to occur in relation to resilient ECEC staff, leadership of kindergartens and researchers in partnership. The research questions are: How can we understand and conceptualise the changing processes occurring when an interdisciplinary team transitioned from face-to-face workshops to a shared digital platform space in a historical time of crisis?

In this chapter, we first briefly narrate the case of what happened when an interdisciplinary team transitioned from face-to-face workshops to a shared digital platform space in a historical time of crisis. Next, we present the methodology with some crucial concepts for further conceptualisation. Here, we include examples from the writing workshop. This chapter proposes the concept of *collective resilient digital agility* to encompass the team narrative.

21.2 The Crisis and Move from Physical Workshops to Digital Platforms

In 2019, the KINDknow Research Centre at Western Norway University of Applied Sciences and Bergen City received funding from the Regional Research Fund for a pilot project called *Kindergarten Teacher as Co-Researcher—Innovation Project for Testing an Exploratory Research Design for Knowledge Development in the Kindergarten Sector* (RRFVEST—305,594). In this project, which lasted from December 2019 until March 2021, four kindergarten schools and Bergen City's administration, as well as researchers from the KINDknow Research Centre, worked together and implemented a workshop methodology called *Exploration and Pedagogical Innovation Laboratories* (EX-PED-LAB).

Due to the COVID-19 pandemic, the project encountered several obstacles, including lockdown with the closure of ECEC institutions, researchers being sent to home offices and transport restrictions for all citizens. Continuance of the project in these circumstances was not straightforward. The most obvious solution was to put the project on hold and cancel or postpone the activities. However, we very soon decided to work out alternatives, and the most apparent solution was a digital solution.

During the first lockdown phase, staff in the ECEC institutions were needed in place to take care of the children of emergency personnel and to keep in touch with vulnerable families by telephone and by greeting families outside through the windows. In the next phase, staff were organised in small cohorts, and all meetings and lunch breaks were cancelled. Subsequently, when the institutions opened for all children, they were still organised in outdoor cohorts, and physical meeting places for all were avoided. In the third phase of the pandemic, the number of people allowed to meet was still restricted.

During the lockdown phase, we soon experienced the fact that the strengths of this project included the participation of the ECEC city authority. The ECEC agency legitimised and encouraged us to find solutions. The staff found it valuable to have a place for discussion among their peers, and the researchers were comfortable continuing. We soon agreed to try to meet up in digital versions of the workshops. However, this decision soon revealed other obstacles. The first was that the digital platforms allowed in the municipality were not the same as those used in the university. Leadership policy decisions were soon made so that we could meet on the same platform. Yet another obstacle needed to be crossed. We experienced the situation that the researchers' homes varied in wi-fi capacity, and the ECEC institutions did not necessarily have access to wi-fi in all rooms. When one was supposed to work in a cohort and not cross from one zone of the building to another, this caused new problems. The kindergarten staff did not have individual computers for all staff, and with pandemic sanitation regulations, sharing of computers was also a problem to be solved. While the kindergarten managers had high-quality offices and computers, other staff sometimes worked on older computers with limitations for new software. The new city regulations during the first phase included opening hours for the

children from 9 am to 3 pm. Despite these stumbling blocks, we found a way forward to continue the partner collaboration. We all agreed to meet up in two-hour sessions in the afternoon. Many people, including staff in the kindergartens, the city authority staff and the researchers, met up in the afternoon from their homes, but some preferred to stay in the kindergartens for the afternoon sessions. Most kindergarten staff then used private computers, and the internet facilities worked better from many homes than from the kindergartens. The researchers had home offices with professional computers and updated software and had meeting-from-home facilities.

Before the pandemic, the partners had vaguely presented the idea of writing a book about the project together. When the digital platform was established, this soon came up again as a triggering idea for realisation. The researchers started to contact publishers. While some publishers were reluctant to include non-academic writers, we succeeded with a contract with an established and renowned publisher, which boosted the group's energy and work joy. A book contract was a strong incentive for us all. For the kindergarten managers, the staff at the agency and the teachers, this was their first published text. For the researchers, this occasion would be the first book written in such a joint and interdisciplinary manner, experimenting with writing genres. To reveal the end of the story, a common digital platform became an artefact that situated the space for collaboration. We achieved our goal of publishing (Birkeland et al., 2022) and included a virtual celebration. We could identify renewed energies elicited through learning to know each other outside the institutional frames and the pleasure of progress and achievement in difficult, solitary times.

21.3 Methodology—Exploration and Pedagogical Innovation Laboratories

Exploration and Pedagogical Innovation Laboratories (EX-PED-LAB) is a workshop methodology starting to develop through the above-mentioned pilot study. The methodology stems from a long tradition of systemic, ecological and transformative learning frameworks (Kemmis et al., 2013; Mezirow & Taylor, 2010; Pascal & Bertram, 2012; Senge, 2006), is inspired by design-based research (Barab & Squire, 2004) and builds new theory with inspiration from selected cultural-historical concepts and methodological approaches. The concept of *collaborative exploration* was first developed to capture collaborative exploration as a primary educational genre in which children and teachers (adults) navigate a landscape of relations by sharing the same place and situation but meeting up as subjective bodies with different cultural histories and societal conditions. To further elaborate on what collaborative exploration can entail in our situation of a team working together on a shared digital platform, we created a design in which collaborative exploration entailed collaboration in an interdisciplinary team. In this context, collaborative exploration

refers to a process where the partners in the early stage are new to each other and live the conditions and the logic of their institutions. Collaborative exploration can also be identified in a certain leadership style: a pedagogical positioning of the leader, of taking responsibility for facilitating and distributing a space for exploration and collaboration.

Drawing on Bakhtin's (1986) metaphor of the loophole, collaborative exploration implies a dialogical understanding of pedagogy as dynamic and responsive to activities in the short term and extended past time. Through the loophole metaphor, Bakhtin indicates that a loophole signifies a side glance or a shift of focus. In our crisis context, this can mean that the participants can be ambiguous about activities and even their own writings. The metaphor depicts pedagogy as movement, process and change. The loophole indicates the metaphor and shape of the team's movement and manoeuvres. Moreover, the loophole metaphor implies the possibility for leaders to adjust to the multitude of voices and events taking place in practice, as one can encircle and unwind a problem. Rather than understanding problem-solving as a linear movement of going from a to b, as a research protocol would, the metaphor of a loophole opens up problem-solving as responsive, a systematic, sensitive and open circular way to learn, change and innovate (Ødegaard, 2020, 2021b).

EX-PED-LAB contains a series of workshops and intermediate work in interdisciplinary teams. The related concept is *relational agency*. Ann Edwards developed this concept in the context of interprofessional activities, where shared knowledge is built in interactions at the points where the boundaries of practices intersect (Edwards, 2005). Relational agency puts activities, practices and the conditions in the institutions that shape them at the forefront of the research design. In line with Edwards's concept, in our context, while experiencing a pandemic crisis, we proposed that interprofessional teams learn from each other, from the affected agents, from the staff and from using artefacts. We came to understand team reflexivity as interactions between minds, orchestrating each other with common ideas, thoughts, attitudes and bodily actions. In such a team, intersubjective reflexivity can be created when team members resonate, giving a shared feeling of developing mutual and common ideas, concepts and understanding (Bærheim et al., 2022).

Exploratory activities are, as described above, dynamic and dialogical. EX-PED-LAB methodology creates a space for exploration where 'knowledging' (Nonaka, 1994), is an encouraged result, understood as practice development and change on the one hand and research on the other. These processes entail the systematic creation of research data. These are audio-recording of dialogues, videos, photos, field-notes and reflexive narratives of self and others. Through collaborative exploration, different types of knowledge and skills are recognised. In essence, the workshops functioned as a space for knowledge creation between the kindergarten teachers and the researchers involved. For 'knowledging' (Nonaka, 1994) to occur, meeting arenas that make it possible to share and create knowledge and learn from each other are required. Consequently, we agreed upon the shared use of a digital platform that was easy to access and ethically safe, with co-writing possibilities and open dialogue opportunities.

We were interested in inquiring about the ‘knowledging’ processes of interprofessional activities. Since we soon experienced that the interprofessional team could rapidly identify the problems and obstacles and address them quickly, *collective resilience* (Glynn, 2021) also became a conceptual thinking tool (Wartofsky et al., 1994) for identifying the processes undertaken by the team. *Collective resilience* leans on cultural-historical theorisations of how team members reinforce each other to strengthen risk situations, overcome them and use them as sources of supporting joint development of practices and co-research. As a construct, resilience is built on the underlying assumption that an individual or organisation has undergone a situation of ‘significant adversity’ and adapted positively (Hormann, 2018, p. 91). Resilience is the maintenance of positive adjustment under challenging conditions, and collective resilience is attained when team members adjust to one another and the situation under crisis or harsh conditions.

According to a cultural-historical perspective, resilience can be understood as a higher psychological function resulting from collaborative processes (Wertsch, 1988). As such, collective here refers to a group of people that shares a sense of common interests or identity and that transcends the individual level of agency in a crisis. Our team was from the start professional and formal, but during the crisis, these formal relations were transcended as it became a ‘new normal’ to check how people were coping, who was sick and talking about the new workplace, the place one worked from and the fun of experimenting with virtual backgrounds. Since some researchers in home offices also had school children at home who sometimes needed attention, the personal and the professional needed to be manoeuvred in new and often unexpected ways. We invited collaborative and individual writing with feedback loops. The researchers warned the staff that writing processes can be hard and time-consuming, but this warning seemed to be encouraging. It was soon established by collective agreement that we should spend unexpected time together and flip the crisis to success for the partnership. The invitation for collaborative writing was a response to an idea from a brainstorming workshop in the initial stage of the partner project, where some participants mentioned publishing opportunities as a trigger for their wish to partner up with researchers. We learned that some of the staff members were highly motivated for extra effort.

The idea was embraced by many of the participants, and the positivity spread easily. Thus, the solution of elaborating writing genres for interdisciplinary teams was born. We decided to explore the ‘field book’ as an open genre inspired by Peter Senge (2006). The researchers held introductions about writing genres and explored the blending of genres for our collective field book. The staff associated writing heroes with a wide range of genres. By stepping aside from academic papers as the only superior genre, we opened up a variety of genres (e.g. self-narrative, visual narrative, narrative inquiry and case studies of selected activities, experiments, poems and guidelines, etc). There is a historically institutionalised supremacy of researchers (academics) in relation to teachers, in which researchers have the right to define the problems of their investigations. This situation has led teachers to take on a subordinate role: researchers are given the role of experts, who can share established knowledge, and teachers take on the role of a learner from the one supposed to build competence (Ødegaard, 2023b).

21.4 Golden Rules: A Genre Expressing Collective Resilience

The diversity and richness of speech genres are endless because the various possibilities of human activity are infinite and because each sphere of activity contains an entire repertoire of speech genres that differentiate and grow as the particular sphere develops and becomes more complex. We placed special emphasis on the *heterogeneity* of speech, including short responses of daily dialogue, everyday narration and writings in the diverse social, political, didactic and pedagogical worlds. Each separate utterance is individual, but in each culture or share in which language is used, it will develop its own relatively stable types of these utterances. Bakhtin (1986) names these *speech genres*.

Even if the team is motivated to work together and make extra efforts, in challenging times, this should not be assumed to be easy. After all, language intersects with life experiences, education, culture and persons and their societal conditions. An utterance and a sentence, a paragraph or a narrative can therefore be a significant node of problems. The digital platform, with the opportunities for collective writing, opened up questions, multiple answers and negotiations. It became important to establish transparent responsible authorships, and dialogue with the publishers supported finding solutions and ending negotiations.

Here, we present an example of a writing genre we call *golden rules*. The content of these golden rules also sum up the tensions and their resolutions among the partners and colleagues. The golden rules are a concentrated form of experience and will live on in other partnership projects (Fig. 21.1).

These 15 golden rules of partnership synthesise our experience with the research project, working in interdisciplinary teams over the historical period of the Covid-19 pandemic. One can see that some of the rules point to being safe (e.g. *breath*, while others refer to the collective—*remember collectively*. All 15 generate a summing up of the knowledge created in working with the genre of golden rules; it was a ‘collective knowledging’. This was similar to what has been found in a study of resilient agility, where this was connected to the mediation of safety to a willingness to embrace change, workplace belongingness, job satisfaction and creativity (Prieto & Talukder, 2023).

The genre itself was created as a process of first sketching out experiences in a mind map, studying literature through a scoping review with an interest in systemic leadership (Birkeland et al., 2021) and case studies of exploration, co-creation and transitions (Fleer et al., 2021), inviting the team for its response before further modelling. In this way, this genre and this piece were co-created.

We communicated in asynchronous time on a digital board and shared our writing in folders on the digital platform for writing in shared documents. Interdisciplinary writing buddies were organised, and we met the whole group five times and met in additional smaller co-writing groups and in sessions on request for learning more about writing genres. The researchers responded to tensions and trouble by addressing them in new sessions and bringing them up in writing. Later, we could also meet up face to face for the latest revision processes.

15 Golden Rules on how to be an exploratory co-researcher

Be open
Everything is interesting.



Select what engages you more
Notice what gives you joy in your work and what creates others' engagement.



Accept that nothing is certain
Understand how you respond to uncertainty and discuss it with others; it prepares you for crises and can, therefore, make life easier.



Notice
Pay attention to the place where you are standing and what happens when you are walking and sitting; and yes, maybe it is sometimes appropriate to check what happens when you lie down.



Fig. 21.1 15 Golden Rules (first printed in Norwegian: Birkeland et al., 2022)

Listen

Pay attention to which stories are told - during the meal, when the children are picked up, in the break room, in meetings and in communication with parents.



See

Observe movements outside and inside, take notice of what happens in the middle and at the outer edges, over time.



Remember the collective

Use literature or follow ideas and traditions backwards in time, look for beginnings and look for possible new beginnings.



Breathe

Think through what you have to endure from boredom and frustration, turn your thoughts to what happens when you go through boredom and frustration - are you able to create meaning through it? How can you sense and identify boredom and frustration in others? By the children, colleagues, and parents?



Fig. 21.1 (continued)

Indulge in play and exploration
Know what it means to be a playful, creative, and exploratory person. This is where we get inspiration and ideas.



Use your professional knowledge of observational methods
Document observations and vary the way you observe.



Use your analytical skills
Notice patterns and connections.



Use your imagination
It is what can make the impossible possible.



Fig. 21.1 (continued)



Fig. 21.1 (continued)

The digital shared space created a new situated presence of spaces in between home and the respective workplaces in the university, at the city hall and in the kindergartens. During the pandemic, home was the workplace for some, and the new digital platform became a third meeting place, belonging first and foremost to the team, not to the academics, the staff at the agency or the staff in the kindergartens. The digital third space was socially produced through disrupting the historical power relations and establishing social interactions in new ways. In third-space collective sites for collaboration and innovation, both joint and individual sense-making occurs (Gutiérrez et al., 1999).

21.5 Collective, Resilient Digital Agility: Summing up the Role of Digital Platforms

In this chapter, we have examined collective resilience through a narration of a period of time during the Covid-19 pandemic based on cultural-historical concepts. The findings highlight the importance of the artefact of a digital platform being a third space, a collective space to explore, write, negotiate and rewrite together.

These experiences with the EX-PED-LAB methodology underline its processes, with development of ideas and identification of nodes of tensions and problems, multimodal co-creation of data, analysis, fabulation, testing and knowledge-sharing, including its innovative potentials. The components involved sharing dilemmas and disturbances of practices, as when we struggled with finding a shared digital space accepted by the two institutions: the university and the city agency. The components also reveal how collaborative exploration of writing genres, such as the field book genre, led to engagement, constructive negotiations, dialogue and collective resilience. The writing process in shared documents opened up the sharing of recognition and hope in times of crisis, but also reflexivity, critical assessment, dreams and imagination (Ødegaard et al., 2023).

To be able to work together as partners is not straightforward. In the case presented here, the teachers and researchers rapidly solved the problem of using different communication systems and dealing with different working hours when the pandemic crises made it impossible to meet up face to face and to meet up within regulated working hours for the early childhood sector. In this chapter, we have considered how a common digital platform, a technical artefact, can create the possibility of teachers as co-researchers, leading to the development of an interdisciplinary team towards a collective. Inspired by cultural-historical theorisations of collective resilience, we have described how team members reinforced each other to strengthen risk situations, overcome them and use them as sources of supporting joint development of practices and co-research, supported by a software artefact. We call this *collective resilient digital agility*. According to a cultural-historical perspective, resilience can be understood as a higher psychological function resulting from collaborative processes (Wertsch, 1988). The chapter has reported on the

results and impact and the changes from planned on-site, face-to face workshops to digital collaboration, emphasising the writing process and exploring writing genres. The inquiry showed that the crises of the pandemic and the shift to using a new artefact, a digital platform, changed what it was possible to do, strengthening resilience and ways of working together and opening up a co-creative writing genre. With this study and conceptualisation, we can enhance interdisciplinarity and partnership research.

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Chapter 22

PLUM—SKUM: *The Making of a Handwashing Video for the Youngest Children After the Outbreak of Covid-19*



Elin Eriksen Ødegaard  and Håkon Hoffart

Abstract This chapter demonstrates how information regarding infection control was recrafted on the principles of critique and attraction to art and imagination in a digital agile response in a time of crisis. The chapter narrates the process of making a video targeting the youngest children by using cultural-historical and aesthetic analytic models and concepts where co-creation, creativity and imagination are crucial. The design was explorative and collaborative, as the process involved ongoing dialogue between the researcher, the artist, a family with children aged two and four years, kindergarten teachers, and children in three groups (1–3-year-olds). Inspired by a cultural-historical methodology of collaborative exploration, we name the event as pedagogical innovation. We start off with a problem experienced in the early days of the pandemic: informing children about the importance of washing one's hands. The information provided by the health and educational authorities was almost exclusively shaped in a manner best suited to ages four and up. The authors identified a lack of developmental and institutional knowledge and awareness regarding successful communication with children in the tool kit provided by the authorities. Although older children might follow the commands of adults regarding infection control, younger children lack the logical tools to process such information. On the basis of this critique, we responded by engaging children, kindergartens, and families in the co-creation of a 90-second video. This animated short video used imaginative language rather than the more common instruction, with the aim of targeting the youngest children. The result of the creative co-creation was a colourful, abstract cartoon language with stimulating rhythms.

Keywords Child culture for 1–5 · Arts · Collaborative exploration · Research with children · Imagination · Resilience · Digital agility

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QR Code for the Video PLUM-SKUM

(Ødegaard & Hoffart, 2021)

En dråpe såpe

Barra-barra rann-vann

Barra-barra kåpe-såpe

Barra-barra plum-skum

Barra-barra plask-vask

Barra-barra børr-tørr

English:

A Drop of Soap

Barra-barra daughter-water

Barra-barra coat-soap

Barra-barra plum-skum

Barra-barra splash-wash

Barra-barra try-dry.

22.1 Introduction—An Innovative Response

Any human act that gives rise to something new is referred to as a creative act, regardless of whether what is created is a physical object or some mental or emotional construct that lives within the person who created it and is known only to him (Vygotsky, 2004, p. 7). With these opening words by Vygotsky, we introduce a chapter that demonstrates how information regarding infection control was creatively recrafted, based on a critique of an existing information video crafted on the initiatives of The Norwegian Directorate for Education and Training and an attraction to art and imagination in a digital agile response in a time of crisis.

A drop of soap, the rhyme in the video, was initiated by the first author, and further elaborated in collaboration with a two-year-old boy and a four-year-old girl and the children's mother. We are all bonded as a family but live in two different countries; the meeting place was usually a digital platform or smartphone and, during the pandemic, no other options were available. Daily life and keeping safe from the virus were repeated topics in our conversations. Elin (first Author) first introduced existing songs and some beginning lines for a new rhyme connected to water,

washing, and soap as a playful approach to a conversation about handwashing. This playful start triggered the four-year-old, so she started to add lines to the rhyme we started to create. The mother, the girl, and the boy started to use the rhyme while handwashing, and a recorded version of the girl saying the rhyme was added to an animated film. The authors of this chapter agreed on the design of this animated short video film, addressing the youngest children. It should inspire handwashing, not by being a moral imperative but rather by being associative and inspiring to explore water while washing one's hands.

With this description as a starting point, this chapter narrates the process of making a video targeting the youngest children by using cultural-historical and aesthetic analytic models and concepts, where co-creation, creativity, and imagination are crucial. We describe a problem experienced in the early days of the pandemic, namely informing children about the importance of washing one's hands. The information provided by the Directorate of Education was almost exclusively shaped in a manner best suited to ages four and up. The authors of this chapter (an artist and filmmaker, a child specialist and early-years researcher) identified a lack of awareness regarding successful and age-appropriate communication with children in the tool kit provided by the authorities. Although older children might follow the commands of adults regarding infection control, younger children lack the logical tools required to process such information. Based on this critique, we responded by engaging children, kindergartens, and families in the co-creation of a 90-s video. With the aim of targeting the youngest children, this animated short video used imaginative visual language, rhymes, and rhythms rather than the more common instruction. The result of the co-creation was the crafting of a colourful, abstract animation with stimulating rhythms.

The film was tested by an adult audience (the research group), in a family with one child aged 2 years, and in seven groups of three children (one-to-three-year-olds in an early-year institution). The feedback from the adult researchers was mixed: some liked it, some as it was, and mentioned especially that the sound of the girl saying the rhyme touched their emotions in a positive way. Others were reluctant in their feedback. This reluctance was due to the lack of a narrative thread and the lack of a main character. The family responded positively; they enjoyed the film and praised the surprises that popped up during the 90 s. The responses from the 27 children, watching it in groups of 3 at a time, were observed by staff and by the second author. The children seemed to enjoy the film, as they laughed and asked for repetitions. Small adjustments were made after these rounds of testing. Since the voice of the girl saying the rhyme was mentioned positively by the adults several times, we repeated this sequence.

This chapter presents its cultural-historical perspective by drawing on Vygotsky's concept of imagination to explain why an associative animation video seemed to appeal to children and to inspire them to explore streaming water and handwashing. In a cultural-historical paradigm, the concept of imagination supports the argument that children would benefit from knowledge of what imagination entails for their understanding and development. Knowledge of children and childhood and of the emergent understanding of the early ages is useful when it comes to how best to communicate with the youngest children.

22.2 The Problem—Ignoring the Youngest in Society

With the metaphor of ‘loophole’, Bakhtin indicates a side glance, or a shift of focus, where the person involved in an activity (in Bakhtin, it will often be the hero in a novel) can be ambiguous to events (Bakhtin, 1973, pp. 233–234). With the metaphor of loophole, we explain our response to the film launch by The Directorate of Education and Training, at the point in history when children were to go back to schools and kindergartens after being isolated in their homes during the first period of the pandemic. The opening of society was followed by a series of infection control rules and guidelines. The film, launched by The Directorate of Education and Training, was an attempt to give information to children when going back to their institutions. While nearly 100% of children aged 4–5 years attend an early-years institution in Norway, nearly 90% of all children aged 1–3 years attend a full-day institutional stay. This means that providing information to children is a complicated task for authorities. Due to maturity and developmental age, giving information to a very young child is not obvious. This might be the explanation for why the authorities gave information in the manner they did: repeating information, which was directed to the adult audience, on keeping distance and handwashing to avoid the virus.

Giving information to children and listening to them had been on the Norwegian authorities’ agendas since the beginning of the pandemic. The prime minister of Norway, Erna Solberg, gave regular ‘children’s press conferences’ through national broadcasting, with opportunities for children to ask questions (Pramling Samuelsson et al., 2020). This way of reaching out to children has been institutionalised in Norway since the first establishment of the Ombudsman for Children in 1981. In all these years, the outreach to children and children making use of the ombudsman and practices for being involved in society has been, for reasonable reasons, mostly for children of the age of 6 years and up, when they can read and write. How best to give generic information to the youngest children is not evident, as a local contextualised approach will be considered best.

It was with a side glance that we started our explorative journey. Interested in culture and communication provided for children, we studied the information video produced by the health and educational authorities when the early-years institutions reopened for children during the Covid-19 pandemic (The Norwegian Directorate of Education and Training, 2021).

22.3 Crisis in Development

Vygotsky’s cultural-historical theory about child development set a premise of development as a result of social interactions. In this way, children’s meaning-making and understanding are inherently collaborative (Vygotsky, 1998). Social negotiation is essential for building knowledge and understanding concepts. From its start as a newborn, the child will fuel development through biologically

programmed (lower) mental functions such as attention, sensation, perception, and memory. From the start, engaging in relation to others and the environment allows humans to use these abilities to develop ‘higher’ mental functions. The young child is, however, not a blank slate. Vygotsky recognised that the infant comes equipped with innate response tendencies that challenge the caregiver. In the first years of life, when biological programs dominate behaviour, behaviour is an automatic reaction to apparent features of the environment. With experience, the child will develop increased sensitivity to the environment, a better comprehension of it, and flexibility towards it (Vygotsky, 1998, pp. 293–295). According to Vygotsky, a child’s development is indicated by crisis. This is further elaborated and exemplified for institutional settings by Mariane Hedegaard. When a child meets new demands in new institutions, the child appropriates new competencies because what is known does not fit the existing practice (Hedegaard, 2012).

22.4 Imagination and Reality

According to Vygotsky, the first premise for imagination is the association between imagination and reality: *It stems from the fact that everything the imagination creates is always based on elements taken from reality, from a person’s previous experience* (Vygotsky, 2004, p. 8). Vygotsky proposes that imagination will always build on using materials supplied by reality and that imagination may create new levels of combination as creative processes. Broadening the experiences of a child will, as a consequence, enrich the foundation for the child’s creativity. The more the child experience, the more productive the imagination will be. During a crisis situation, new and unexpected realities can pop up. During the Covid-19 crisis, there were a lot of restrictions on children, families, and intuitions, and activities and experiences became more limited.

The researchers were also limited. For example, in order to do the observations of the young children’s responses to the video, the observations had to be staged outdoors. The second author needed to observe at a distance when the small groups watched the video on a digital screen, sitting in small groups on a bench outside. Very soon thereafter, the health authorities in Norway advised that children under the age of three should avoid screens both during family time and in institutions. It was easy to understand the background for such a piece of advice, as small children and screen time had, for a long time, been disputed. From the situation emerged a paradox: at a time when children had limited access to experiences, due to all restrictions on movement and socialisation, a piece of experience, namely a video of 90 s with colourful and playful associations to water and handwashing, was restricted from them.

How can we see the link between the film, as reality and experience for children, when it is also a piece of collaborative imaginative art? Vygotsky points out that fantasy and reality are not oppositionally different. He draws on examples to explain the relation between them. He says that when we know something, we do not only

reproduce what we know; we create new combinations from a series of knowledges and experiences. The products of the imagination consist of *transformed and reworked elements of reality and a large store of experience is required to create these images out of these elements* (Vygotsky, 2004, p. 11). We are dependent on experiences in order to create concepts and understandings. Seen in our context, this could mean that the children used their reality experiences of handwashing, of streams of water coming from a tap, of pushing the soap dispenser for drops of soap, to associate and imagine playing with water. This reality inspires them. When, suddenly, a reptile pops up in the video, washing his hands, this micro event might be outside their reality; still, he is washing hands, which is in the frame of reality, so the designer plays with forms inside and outside reality. The response of laughter when the surprises pop up must be seen as a sign of developmentally appropriate events. The children already have emergent concepts of water and handwashing from everyday life experience, so the film elaborates on these concepts in a playful manner. Vygotsky points to how imagination is dependent on previous experience, on the one hand, and, on the other how, at the same time, there is something new in constructs of fantasy in every person. This means that even if the product (the video) is a new digital reality, the experiences of persons responding to it will vary. Vygotsky (p. 66) also points to the connection of children's imaginary, the meaning-making of parts of the whole, in the making of props, scenery, and costumes when playing and how these activities provide a pretext for visual arts and crafts. When the girl suggests a line in the rhyme, she takes on meaning and purpose; she engages in her own life conditions.

Hedegaard draws upon Vygotsky in her study of street art (Hedegaard, 2014) when she points to emotion and imagination as the core in the aesthetic experience: *Imagination and emotion in art become real through relating to the person's life as a cultural and societal being. Art proceeds from certain live feelings and in art humans realise aspects of psychic tensions that find no expression in everyday life* (Hedegaard, 2014, p. 8). For her, like Vygotsky, emotions do not create art per se; the creative act comes into being when overcoming an emotion. In our project making associative imagery, we used our own imagination of what would be appealing and open-ended for a very young child and developed an aesthetic language of moving pictures accordingly.

This collaboration was based on at least four strains of knowledge: (1) a theoretical and practical knowledge of children's development and the role of play and imagination in children, (2) an art-based knowledge of aesthetic expression, (3) a technological knowledge of animation and sound, and (4) a methodological knowledge of collaborative design.

In addition to the knowledge, this narrative also shows digital agility. As pointed out in the introduction to Part V, digital agility is the ability to move easily and quickly by leveraging digital technology and solutions and reflects a person's ability to be outward-looking and adaptable to a changing world (Kucirkova & Quinlan, 2017). While the knowledge of children's development, aesthetic expression, technology and collaborative design was crucial in order to carry through pedagogical innovation, digital agility was the transferable knowledge, an agency to respond to

the flaws in communication by the authorities and lack of material provided for the youngest children, the one-three year-olds in kindergarten.

22.5 Conclusion—Art as Inspiration for Pedagogical Innovation

The design of the film *One Drop of Soap* was to co-craft a video as a response to crisis where handwashing was important for all citizens, including the youngest children. The chapter has opened up the process of relational imaginative art with and for children. At the same time, it narrates a pedagogical innovation for the early years, as well as it showcases digital agility during the Pandemic.

The film emerged from the problem of flaws in the communication available about infection control for children, and especially how it misappropriated the language of institutional informatics to get children aboard; the need for more open-ended communication became apparent. We sought to convey the activity of handwashing as it is experienced by young children and by staff in a format similar to what they are used to in their daily lives. Rather than neutral third-person instruction, we deemed it more favourable to give children a sense of ownership and identification.

It is not paramount that a 2- or 3-year-old understands precisely the specifics of why clean hands are important with regard to disease. While parents or kindergarten teachers dutifully propagate new routines, a child does not necessarily need a cognitive process of the cause in order to be an ally of it. The child can simply enjoy and experience the activity on its own terms. The motivation to embrace the activity does not rely on reason but rather on attraction and fascination. Thus, if an ‘infomercial’ is to be effectual, it should simply stimulate attraction to the experience itself.

For this chapter, we emphasised that the making of the film was a collaborative, explorative process. One cannot assume that collaboration occurs simply because several people are working together. We claim collaboration because the design promoted dialogue, sharing, and picking up on perspectives for developing a product: the film. Collaboration implies the negotiation of decisions (Carvalho et al., 2021, Ødegaard, 2021). Collaborative exploration, as characterised by the process of the making of the film, holds the promise of contextual responsiveness to children’s lives and formation and is suggested as a signature of the educational approach when working with children, families, and staff (Ødegaard, 2021). With a cultural-historical approach, we contribute to the universal inquiry of how to educate the young child for the future, when all we know is the past and the present. Researchers, families, and teachers are responsive to children’s lives and learn to navigate crisis with responsiveness to the local and situated child and group, informed by knowledge of child development, while at the same time acknowledging a mandate of children’s safety during times of crisis.

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Chapter 23

VR Technology in an Engaging Early Childhood Teacher Education



Nils Christian Tveiterås  and Thomas Bjørner 

Abstract In this chapter we discuss and reflect on methodology in research into the use of Virtual Reality technology (VR) in early childhood teacher education and how this technology might influence the students' learning environment and learning outcomes. The use of digital solutions for online teaching and collaboration is already common in higher education, but despite an increasing interest in VR, the possibilities with this technology are so far less investigated, especially in this field of education. The aim in the chapter is to suggest and discuss how such research might be designed and carried out, including considerations on how perspectives from cultural-historical theory can be relevant. A VR engagement model is proposed where elements from cultural-historical theory is combined with elements from engagement theory and VR research literature. Following the theoretical contribution, a tentative project is described and discussed as a possible context for investigating the model's usefulness further.

Keywords Online teaching · Virtual Reality Technology · Early Childhood teacher students · Cultural-historical · VR engagement model

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23.1 Introduction and Context

23.1.1 *VR in Education*

This is an era where various companies and institutions are grappling with and embracing a range of new Virtual Reality (VR) technologies for the social good, including various new learning opportunities. Within the field of education there is also an increased interest in VR, both in practical application of the possibilities, as well as a growing body of research (see Billingsley et al., 2019; Luo et al., 2021; Pellas et al., 2021).

VR generally refers to a computer-mediated simulation, imitating a physical environment (Slater & Sanchez-Vives, 2016). Past research has already revealed how VR can be used in teaching and education, investigating factors such as perceptions and behavioral intentions (Badilla Quintana et al., 2017; Leite et al., 2020; Shen et al., 2019; Shin, 2017). In VR the user can navigate through an imaginary setting and interact with items or other virtual entities, using either body movements or a remote controller, artificially creating or perceiving a sensory experience of being inside a virtual world. A commonly used argument for using VR in an educational context is its potential for increased engagement within an immersive experience; or even get the sense of presence and the perception of ‘being there’ (Bronack, 2011; Petersen et al., 2022). Maybe due the immersive elements, past research have revealed some potential positive effects for increased learning with the use of VR experiences including enhanced engagement, reduced error rate, learning by own time and pace, and facilitation of interactive learning (Fussell & Truong, 2022; Parong & Mayer, 2018; Petersen et al., 2022).

As VR has become more available and affordable, more opportunities to engage in social learning practices have followed. Past research has most often focused on individualized VR learning experiences with simulations or game-like approaches (e.g., Johnson-Glenberg et al., 2021; Lui et al., 2020; Pande et al., 2021). As a consequence of the technology development, there is now a need for more research into the social aspects that VR might provide in a learning context.

23.1.2 *Times of Crisis*

The times we live in are also times of big challenges and crises. According to Dafermos et al. (2017) within a cultural-historical perspective, crisis can be defined as “a major shift connected with transformation of the social situation of development” (p. 8). Though originated in psychology, Dafermos (2022) argues that a Vygotskian concept of crisis can and should be expanded beyond this field and be elaborated as part of broader social theory with a dialectical perspective with crisis not only being something negative or positive.

Along with digital technology developing at a rapid pace, the world has also faced some large challenges the recent years. The Covid-19 pandemic affected the whole world, and recently the war in Ukraine has put, at least Europe, to another test. In such times, we look for solutions, and often attempts to solve problems entail looking to technology. In the case of the pandemic, school closings led to a massive exploration of the possibilities for online teaching and collaboration (see e.g., Van Der Spoel et al., 2020). Though the experiences from the pandemic situation varied, there is little doubt that the technology development of the preceding decades provided a whole range of teaching opportunities to help the situation. Extending from this, the use of VR might be an even more engaging way to interact online in situations where meeting physically is not possible (Bower et al., 2017). One example can be in times of crisis like the Covid-19, with strict restrictions and social distancing. However, we must also deal with the climate crisis which requires rethinking how we can do social interaction and collaboration across large distances. Here, technology, both video conferencing and newer VR solutions, will likely play a large role.

23.1.3 Study Context

At UiT The Arctic University of Norway, there are several initiatives to investigate the area of VR in education. Among these is this current project, that is connected to a decentralized program in early childhood teacher education (BLU). The program combines online teaching and on-campus gatherings, hence there is an interest in finding good solutions for remote learning. The initial intention with VR in this context was to find out whether this technology has potential to provide a better learning environment and learning experiences. The pandemic situation has highlighted challenges in online learning and made such investigations even more relevant. While one could imagine situations from the early childhood education that would be suitable for simulation or 360° video experiences, the focus in this project will be on the possibilities for social interaction among students and lecturer in a virtual environment.

Due to the specific attributes of the field of early childhood education, there are also good reasons to take advantage of the opportunities for play that comes in VR. *The National Guidelines for Early Childhood Teacher Education* (UHR Teacher Education, 2018) describes play as a form of learning and living that has an intrinsic value, and that play is of crucial importance for all-round development. The guidelines are also being specific regarding the digital, when they state that candidates must be able to “stimulate children to explore, play, learn and create through digital forms of expression”(UHR Teacher Education, 2018).

Play is an important part of the traditions of Early Childhood education. As mentioned, it has intrinsic value, but it also entails many important “side effect”, among them the use and development of imagination. Fleer and Hedegaard (2010) write

that “imagination in play is particularly important for building children’s theoretical thinking, and that all educational programs (including those focused on discipline knowledge) need to develop imaginative thinking in unity with cognitive development”. Hence, there are good reasons for exploring use of technology in playful ways, not least during the preparation of teachers for work in kindergartens.

23.1.4 Research Question

The broader question of the study is how VR can play a part in students’ learning. However, before one can investigate if and how it influences learning, students and lecturers must be willing and motivated to use it. In this chapter we therefore narrow the focus down to:

What factors can impact the willingness and decisions to utilize a new technology such as VR, for educational purposes?

To answer the question, we propose a model that brings attention to advantages and barriers of the various elements of engagement in the use of VR technology. It is not a new teaching model, but by describing a tentative teaching scenario, we attempt to show how the model might be useful in an educational setting. However, because of the focus on this context, we mostly use the term VR learning activity instead of term VR experience, which is more common in the literature.

23.2 Theoretical Contribution

23.2.1 Presentation of Model

Before getting to the VR learning activity with the potentials of immersion or presence (Slater & Sanchez-Vives, 2016), there are some fundamental and complex reciprocities of engagement. We would like to emphasize the importance of engagement before and after the activity, and the dis- or reengagement regarding the desire whether to use the VR technology for educational purposes again. We would like to propose a VR engagement model. The inspiration is from O’Brien and Toms (2008) engagement model and Engeströms third generation of the cultural-historical activity theory (CHAT) (Engeström, 1999). O’Brien and Toms (2008) who, in the context of human–computer interaction, critically deconstruct and demonstrate various definitions of engagement and suggested to look at engagement as a process comprised of four stages: point of engagement, period of sustained engagement, disengagement, and reengagement. Furthermore, O’Brien and Toms (2008) suggest various attributes of engagement that pertain to the user, the system, and user–system interaction. Their framework for engagement as an ongoing process is a good starting point, although the attributes could be considered a bit generically described

and their model does focus much on intrinsic motivation. Engeström (1999) framework for the CHAT theory builds on top of Vygotsky's theory of cultural mediation, and Leontiev's collective model. The CHAT theory includes a triangle of rules, community, division of labor, subject, object, and instruments (Engeström, 1999). In short, activities involve subjects working towards achieving objects and outcomes, through mediated action involving sign, tools, and artefacts. Collective activity involves subjects acting as part of communities, with those actions mediated by rules. For the community to achieve their goal requires division of labor through determination of roles and responsibilities. The critique towards Engeström's CHAT model is the missing elements of barriers/disruptions, a progression of time, and missing elements of various motivations from the participants.

The concept of play is an important part of the theoretical foundations of the model. Regarding engagement, O'Brien and Toms (2008, p. 952) write that "play is the physical activity that encourages learning and creativity (...) Play has been associated with increased frequency and satisfaction of system use and has been attributed to increased motivation. Thus, elements of play are intrinsic to engagement." Also, going back to the origins of CHAT, the work of Vygotsky also emphasized the importance of play for human development (Bjørnestad et al., 2022). Hence, though not explicitly mentioned in the model, play and playfulness is still at the core.

For describing and exploring how a VR learning activity for pre-service early childhood teachers provide engagement with and awareness of specific learning content, we will propose a circular VR engagement model (Fig. 23.1), which focuses on engagement elements and their subsequent features. The basic tenet in the model (Fig. 23.1) is that the participants go through a dynamic progression of different engagement stages: before, during, after, and dis- or reengagement. In all stages, there is also the possibility of 'going' to reality, either with or without intent.

23.2.2 Before: From Physical Reality to VR Engagement

Teaching success and providing learning depend on the participants' motivation to start learning, spend their time, effort, and energy on it. Hence, participants' intentions to interact with the VR technology are crucial, as being part of the learning. The participant typically begins at the level of reality. The reality construct in the context of VR environments and other media is very complex and used in many ways. We define reality as the level at which the participants have total awareness of the surroundings and are not involved with (or has perceptual attention to) the VR environment. Among many scholars, Bartle (2004) has described the complexity between the real world and virtual world and has defined the world as an environment that its inhabitants regard as self-contained. However, all the entities in this environment do not necessarily act under the direction of the individual people due to its social (multi-user) acts that several participants (community) affect simultaneously (Bartle, 2004). The included 'reality' factor also emphasizes that the VR

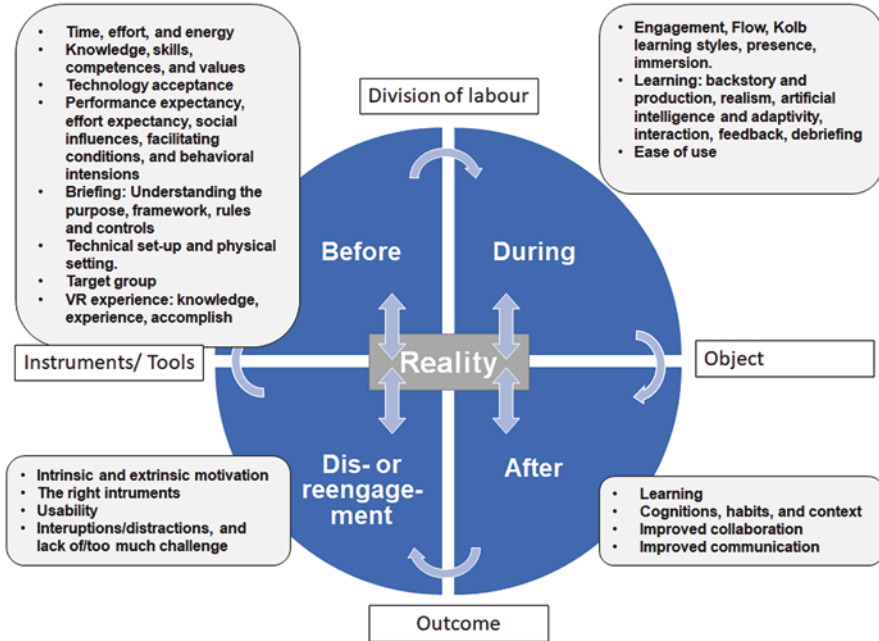


Fig. 23.1 VR engagement model

environment is not an isolated media but can be merged or used in complex interactions with other medias, both synchronous and asynchronous in talks, chats, text messages, books, films, both individually and in groups/communities. It might also add some interesting elements to the CHAT theory, that the interaction between subjects and a community can be of artificial characteristics with e.g., avatars, chat-bots, virtual signs or other entities within VR.

The participants starting point from the physical reality comes with many different variables, for example, different knowledge, skills, competences, and values of specific elements with the learning content. Here, we understand knowledge, skills, and competences both within specific learning content and with different knowledge, skills, and competences for the VR activity. For the same reason, the VR activity needs to be adjusted to or adjustable for different participants to have a good VR entrance. Other scholars have also emphasized the importance of the technology acceptance (Fussell & Truong, 2021; Shen et al., 2019) and include elements such as performance expectancy, effort expectancy, social influences, facilitating conditions, and behavioral intentions (Shen et al., 2019) before starting a VR activity.

Further, it is important with a good briefing to have the participants understand the virtual experiences, the purpose and framework, which can be included as an introduction or tutorial. A tutorial can also guide the participants in terms of the VR’s framework for the rules and controls. The tutorial can either be integrated into the VR activity or completely separate and optional.

Dealing with VR activities it is important not to neglect the technical set-up before entering the virtual environment, including e.g., software updates, VR- and internet connection, power, not working/broken equipment etc. Further the physical setting in which the VR-activity takes place also have an impact; and provide limitations for e.g., the duration of activity and how playful and wild you can be with the controllers.

Before starting the design of a VR learning activity, it is important to consider the target group in terms of age, gender, culture, geography, and other demographic variables. Presumably, previous experiences with VR are crucial in the ‘before’ stage. When participants have mastered specific challenges, they develop a greater level of skills that can be used and improved with increasingly complex challenges in other levels (De Jans et al., 2019). This might also have a positive influence on the intrinsic motivation for the learning content (Wouters et al., 2013). Intrinsic motivation most often refers to engaging in an activity purely for the pleasure and satisfaction derived from doing the activity (Deci, 1975). When a participant is intrinsically engaged, they will more likely start using the VR activity voluntarily, in the absence of rewards, external constraints, or teacher/educational demands. Scholars could discuss whether learning in general may need to focus more on the intrinsic motivation because the learning need to invoke curiosity, flow (i.e., the interplay between challenges and skills), be fun and enjoyable, and eventually allow the participants to gain new knowledge. Before the VR activity, it is also necessary to clarify what it can provide in terms of gained knowledge, what to experience, and what to accomplish. As a transformative element into the VR learning activity, labelled as division of labor, it is important that there also from the instructor or other peers is provided some framework and settings of what both the individual VR participants and others within group should do and why (division of labor). This also include e.g., specific roles of peer support, e.g. with technical- or navigation support, and monitoring for e.g. avoiding potential cybersickness, which is a well described risk in VR (LaViola, 2000).

23.2.3 During the VR Learning Activity

Scholars have developed various definitions and specific suggestions for how to increase participants’ engagement, keep them in the flow, and provide various aspects of motivation, enjoyment, and involvement in the VR experience (Brill & Park, 2008). Theories used to describe and analyze the ‘during’ engagement is described within e.g. (game) engagement theories (Valenti et al., 2020), the flow theory (Csikszentmihalyi, 1997; Hassan et al., 2020), Kolb learning styles (Leite et al., 2020; Shen et al., 2019), spatial and social presence (Biocca & Harms, 2002), and immersion (Biocca & Delaney, 1995). Further, it should not be neglected that for a potential successful VR experience it is very important with an ease of use, with a good usability and user experience (Shin, 2017). The issues of low usability

and uncomfortable user interface have been claimed to have negative effects on user acceptance (Rienties et al., 2016).

23.2.4 After: Engagement After the Activity

The ideal engagements after the VR learning activity is an object of learning. However, some general problems exist in measuring these aftereffects. Measuring learning effects based on a VR activity can be difficult because it includes complex dynamic processes that might take time and can take on many shapes. Further, participants each have their own unique set of cognitions, habits, and contexts that mediate the change process; thus, the shape of change will also increasingly differ between individual users. Therefore, both the validity and the reliability of the correlation and causality between VR activity and learning it still to be further studied. However, it might also be useful to expand specific learning effects to also include e.g. improved collaboration, improved communication, or other affordances (Luo et al., 2021; Shin, 2017).

23.2.5 Dis- or Reengagement

Reengagement is the desire to participate in a VR learning activity again. This comes with much complexity and reciprocities with some of the elements in the other three factors. However, it is not the same as the ‘before’ because there are already elements learned, trained, and skilled, as well as the briefing might not be as important as when starting a new VR activity. The VR activity will not be the same; however, there remain elements of both intrinsic and extrinsic motivation. However, based on the outcome, there might also be potential discussion of whether VR is the best tool for the specific learning purposes. Further, it is also well-described how poor usability, and lack of/too much challenge can be a factor for dis-engagement (O’Brien & Toms, 2008).

23.3 Discussion and Conclusion

In our case, VR will be tested out as an alternative or supplement to ordinary online teaching. The software platform Engage provides opportunities for cooperation between participants in the form of avatars in many possible virtual environments, e.g., a lecture hall, a meeting room, or a forest. The platform is not specifically designed for our specific educational context but is a more general software that users can customize and use for different purposes. This has similarities to a lot of digital resources used in education where software or services function as a frame

that the educator can add content to. However, it might differ slightly from many approaches in VR and education, where the designing and production of specific simulations or learning experiences often demand large amounts of resources.

We will here take as a tentative starting point the specific subject “BLU-1223 Language, text and mathematics”. The subject curriculum states that media culture is one of many areas that will be touched upon. Among skills that they are supposed to develop we find using digital tools in working with the subject. Together with more concrete content and learning objectives, this gives a good foundation and relevance to the project. The students will have some physical gatherings, and one of these will be used for a briefing and an introduction to the technology. In this phase it will be important to provide the participants with purpose, framework, rules, and expectations. This also involves what the group should do and why (division of labor), including a set-up to mitigate potential cybersickness.

Learning goals that will be focused on are as follows:

The student has knowledge about:

- mathematical areas that are relevant to kindergarten children, and mathematics as a tool for systematic exploration, thinking and problem solving
- the importance of play and conversation for language and mathematics learning, and the role of literature as inspiration in play

After getting some time to familiarize themselves with the VR unit, students and lecturers on the subject will then take part in a workshop for developing a learning activity in VR that is both relevant to the present subject content, as well as possible to carry out in practice while at home.

The technical part is already set, both the physical device (Oculus Quest 1) and the software platform (Engage). Though the study could possibly generate results valuable to developers and designers, our focus here is on the educational use of the existing technological solutions.

The methodological challenge in relation to the model is to find ways to investigate all engagement stages. We will therefore need multiple data sources and time spots for gathering data. Interviews and questionnaires will provide self-reporting information about the participants’ attitudes and thoughts about the experience during all stages. Observation and recordings are ways to get a view from another angle. The built-in features for recording in VR give some interesting possibilities and will also be considered. By documenting the cooperation during the design process and development of the whole project, we will also have access to valuable information that can complement or modify what is self-reported by participants.

We argue that there could be increased substantial work on the ‘before’ stage, including more emphasis on how to improve the methodology and formative evaluations within motivational and engagement factors for starting the VR activity and interacting with specific learning content. This could include work in improved teacher involvement, pilot testing, target group analysis, and genre/VR evaluation. When evaluating especially VR activities with learning purposes it is important not to neglect the challenges of finding the right match of both the participants’ cognitive abilities and a solid methodological approach.

The open landscape of possible exploration in this novel field invites many approaches to choose from. As mentioned earlier, we want to shift the emphasis away from the individual learning experience in VR and delve deeper into investigating the social aspects, i.e., how students are interacting with each other, lecturers, as well as other entities inside VR. Further, we aim at identifying factors that increase and sustain students' engagement in the virtual learning activity. The proposed model encompasses both objectives and will hopefully prove useful.

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Chapter 24

Digitalizing Internationalization for Cross-Cultural Collaboration in Early Childhood Education during COVID-19 Crisis: Lessons Learned from the UTFORSK Project



Aihua Hu and Åsta Birkeland

Abstract The COVID-19 crisis has posed unprecedented challenges to every aspect of lives across the globe. The cross-cultural collaboration project (UTFORSK) including Norwegian and Chinese early childhood education researchers and practitioners reported in this chapter is no exception. Although challenged, we grasped this opportunity to utilize digital platforms in an innovative way to keep the collaboration sustainable and resilient. We conducted digital workshops in addition to the traditional use of digital platforms for information sharing and communications. This practice has enabled a closer relationship between ongoing professional development and research on education for sustainability. Taking a departure from a project titled *Our Neighborhood* designed prior to the COVID-19 crisis, we hold a series of digital workshops to share stories, photos, plans, and other artifacts as well as to listen to each other and discuss different aims, conditions, and implementations of each local kindergarten's project. This chapter aims to present how this cross-cultural collaboration worked through digitalization, especially through a series of digital workshops during the COVID-19 crisis when face-to-face meetings are impossible. It also aims to explore how digitally collected data are used to inform further action. Cultural-historical approach is used to guide the presentation of this chapter. The chapter ultimately aspires to illuminate how to integrate digitalization into internationalization for cross-cultural collaboration in the early childhood education context and beyond.

Keywords Cultural-historical approach · Digitalization · Cross-cultural collaboration · Innovation · Artifacts

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24.1 Introduction

Extensive research has documented the advantages international collaboration has brought to education at different levels (Blosser & Kubow, 2016; Maguth & Hilburn, 2015; Wollons, 2000). Cross-cultural communication and collaboration skills including intercultural sensitivity and understanding are listed as essential twenty-first-century skills (Evans, 2020; Joynes et al., 2019). Within education, teachers capable of operating in an ever diversified and global world is highlighted as an important educational strategy. In addition to the enhancement of cross-cultural communication and collaboration skills, international collaboration in education improves participants' professional development (Birkeland & Li, 2019; Hu & Ødemotland, 2021). Despite multiple advantages, international collaboration within education is vulnerable, such as miscommunication caused by unawareness of cultural differences, language issues, lack of commitment and financial support of the members. Although the development of science and technology has made it possible for collaborators to communicate via digital tools, these difficulties do not disappear. In addition, the use of digital tools is adding other challenges to be approached.

Internationalization with mobilities is a demand, and one of the key strategies for Norwegian and Chinese universities to improve the quality of education they offer, and the ranking of their universities nationally and internationally. A collaboration involving Chinese and Norwegian early childhood education teacher educators/researchers at universities, student teachers, kindergarten principals and teachers was initiated in 2004 and has been enhanced and sustained ever since (Birkeland, 2016; Li et al., 2021). The case project this chapter reports is an UTFORSK¹ project financed by the Norwegian Research Council for international collaboration between Norwegian and Chinese higher education institutions (HEI). The project is composed of a group of people who share a common concern and interest in developing early childhood education (ECE) with sustainability as the main focus. Collectively, the members initiate projects, provide a platform for regular dialogues and production of ideas and knowledge. The core members are relatively stable with new members gradually joining in. The main idea is that encounters with differences, with the unknown and with the unfamiliar may generate disorienting dilemmas (Birkeland & Ødemotland, 2018), disturbance and provoke constant revisions of interpretive modes and theories of reality among the stakeholders (Moss, 2014, p. 82). As such, the project is a place for realizing potential for professional development and learning. However, the project "...cannot predict or control what directions that learning takes since it does not proceed in a linear way, determined and deterministic" (Moss, 2014, p. 81). The most used communication channels are

¹UTFORSK is a program that provides funding for educational collaboration between Norwegian higher education institutions and partners in Brazil, Canada, India, Japan, China, South Africa, South Korea, and the USA. More information can be found <https://hkdir.no/en/programmes-and-grant-schemes/utforsk>

annual physical meetings, students' and members' mobility, emails, and social media (WeChat). The COVID-19 has posed challenges to the physical meetings and mobilities.

The concept of crisis has been frequently used after the outbreak of COVID-19, and COVID-19 is called COVID-19 crisis. Although defined differently, the essence of all definitions is that crisis is "an upset in a [steady state](#)... the habitual problem-solving activities are not adequate and do not rapidly lead to the previously achieved balance state" (Rapoport, [1962](#), p.212). Following cultural-historical perspectives (Hedegaard, [2009](#)), we use the term contradictions to refer to the upsets brought by the COVID-19 crisis to this cross-cultural collaboration. The pandemic has made almost all countries close their borders to international travelers for different periods. China fully opened to international travellers in January 2023. As a public-funded project whose major goal is to promote participants' development through mobilities and joint actions, mobilities are expected and required. Thus, the project experienced contradictions because of the tensions and conflicts between societal expectations and demands. There are contradictions between personal motivations and the current conditions. The main personal motivation of kindergarten teachers in participating in this project is to take part in the mobility program and thereby learn about other cultures and early childhood education through personal experiences. The present conditions have denied this possibility. When being dependent on utilizing digital technology, there are contradictions between expectations of having such digital competence and participants lacking such competence.

Even though the project faces crises at different levels, we are not passive in the face of the crisis. Rather, we are active in thinking of solutions collectively and taking actions to meet the challenges, being innovative and transformative (Edwards, [2010](#)). Additionally, the project participants have demonstrated resilience in the face of the crisis. "Resilience is not a quality that is innate. Rather, it is a construct that is relative, developmental, dynamic, connoting the positive adaptation and development of individuals in the presence of challenging circumstances" (Gu & Day, [2007](#), p. 1305). This chapter aims to share an example of how international collaboration is sustained during a global crisis through a case highlighting the potential opportunities the crisis offers. Our goal is to spark new research and practices with creative and innovative approaches for international collaboration beyond this global pandemic.

24.2 Our Case

When receiving grants from the UTFORSK program for our collaboration we faced comprehensive societal expectations and demands. Firstly, there was an expectation of extensive teacher, student, and researcher mobility and international exchange.

Secondly, there was an expectation of combining educational and research activities by including different stakeholders such as researchers, teacher educators, student teachers, kindergarten principals and teachers from both countries. These expectations and demands were clear premises for the project.

This cross-cultural collaboration project has been achieved through three major areas of activities namely, teacher education, early childhood education research, and kindergarten network, all of which require mobility and international exchanges. In this chapter, our focus is on the kindergarten network and the project named “Our neighborhood” that the network is working on. This project incorporates educational and research activities as essential elements. Research has been an indispensable component of the kindergarten network as we believe that systematic investigation of practices informs and inspires practices.

24.2.1 The Collaboration Before the Pandemic

An important activity that developed gradually from involving different stakeholders was workshops on the topic of early childhood education for sustainability (ECEfS). ECEfS as a major theme in the collaboration has focused on cultural sustainability and belonging exemplified by the topic of the “Our Neighborhood” project. In the annual physical meetings from 2016–2019 held in China and Norway alternatively, the kindergarten teachers shared their experiences and practices within topics such as local cultural tradition, local sites of importance, dramatic play, and storytelling. This sharing was mainly initiated and organized as workshops for and by the kindergarten teachers, so the researchers had a minor position and role. Initially, this sharing was not presented as best practices, but as a variety of practices on joint “problems” to inspire each other (Novoa & Yariv-Mashal, 2003). With this approach, the teachers opened to different ways of doing dramatic play and working with local traditions in the kindergarten. In this way, the workshops enabled the unexpected and new to emerge rather than controlling and evaluating the practices against preset goals and creating new knowledge to advance professional practice. The annual physical workshops as well as researchers’ visits to kindergartens have been indispensable parts of the project.

After the physical workshops about local traditions, the idea of working with “Our neighborhood” as a joint topic was elaborated. Firstly, the idea was an elaboration of local and cultural traditions. Gradually, the idea developed to become part of education for a sustainable future with an emphasis on cultural sustainability and the importance of belonging. The kindergartens were supposed to have a physical meeting and workshop in the spring of 2020. However, the pandemic crisis changed our plans dramatically.

24.2.2 The Collaboration During the Pandemic Crisis

The outbreak of the COVID-19 pandemic was a real crisis for our collaborative project. The expectation of our project was extensive mobility. This possibility was immediately limited and affected the mobilities of students, researchers, and kindergarten teachers. We needed to think differently about data production concerning ECEfS. This could be done by researchers in Norway producing data in Norway and Chinese researchers producing data in China. The closure of mobility also impacted kindergarten teachers' possibility to observe practices and inspire each other.

The kindergarten teachers were concerned about continuing to share their practices and had a strong desire to continue their collective community of practices (Cambridge et al., 2005). However, due to the demanding situation in the kindergartens, partly being closed and reducing activities to digital activities, the teachers could not take responsibility for keeping the collaboration going. Rather, we were looking for possibilities to combine the collaborative community of practices with research interests. In this way, the idea of conducting digital workshops including different stakeholders and sharing of visual materials was brought up, discussed, and thus implemented. Four different workshops were elaborated on the following themes:

1. Sharing project progress and identifying needs and support for continuity
2. Using storytelling in "Our neighborhood" project
3. Including the local neighborhood in a time of pandemic
4. Sharing local projects' development and progress and reflecting on actions taken

The kindergarten teachers presented to each other and shared their thoughts about how this topic was related to cultural sustainability and children's sense of belonging. The common focuses were education for cultural sustainability and belonging and local variations more than best practices with one norm/ideal way of doing it.

These presentations and discussions generated materials about practices and understandings about cultural sustainability and belonging. Establishing a digital platform for sharing contributed to both researchers and kindergarten teachers to see the joint problems we want to approach and not primarily be disturbed by the differences in ECE conditions and practices. Rather, joint concerns about ECEfS were raised. The generated materials have been used not only for reflection on actions and planning for future actions but also for research purposes (Hu & Ødemotland, 2021).

24.3 Discussion – Lessons Learned

The COVID crisis has challenged us to use alternative approaches for cross-cultural collaboration. As a result, we resort to digital platforms as a means to realize cross-cultural collaboration during the pandemic period to sustain the relationship, and

further realize the project goals. Our experience during this period has informed us of the advantages and opportunities digitalization has offered to us.

First, digital technology gives rise to a peculiar form of consciousness and human action and has created new opportunities and possibilities. The digital platforms have helped us solve the embedded contradictions of mobility by flights and made it possible to keep communications and collaboration going. To achieve smooth and good communication via digital platforms, it is important that the project has established a joint culture for collaboration. Once the rapport between participants is established, using digital platforms can reduce the number of physical meetings which is sustainable. Speaking of sustainability, it means not only the sustainability of different dimensions but also the sustainable development of cross-cultural collaboration per se. We need physical meetings and at the same time, digitalization provides opportunities for ongoing dialogue despite the distance. Moreover, our experience is that we have teacher educators/researchers in each of the locations who can support kindergartens, which makes digitalization less vulnerable. Besides, a participant who has extensive knowledge about Chinese and Norwegian culture and early childhood education also contributes to lessening the vulnerability of digitalization. The successful use of digitalization also relies on the participants' familiarity with the neighborhood project and trust of each other.

Secondly, while presenting and communicating using digital technology, the expectations are different from physical meetings. One expectation is that participants have the digital competence to use digital technology to present, share, and respond. In addition, it is expected that presenters use visual materials to clarify the presentation. Furthermore, it is expected that the participants are as active responders as, if not more active than when they meet physically. A challenge we face here is that in the digital workshops, it is difficult to make the participants actively comment and be critical when giving comments. Being critical for some means giving negative responses and/or evaluation. In the previous physical meetings, there were some critical questions and better dialogues. Since it is not easy to read people's body and facial language via digital platforms, it stops people from being as critical as they used to be. Besides, when conducting the digital workshops, language was still an issue since the participants' first language was either Norwegian or Chinese. The language used thus is English. One of the advantages of our project is that we have a colleague who speaks all three languages and thus can act as an interpreter when necessary. To encourage participants to be more active and critical in providing comments and feedback on digital platforms, it is important that the presentations are sent to them beforehand so that they can make some preparations.

Thirdly, the focus on cultural differences faded. When the participants met physically, they were to some extent overwhelmed by experiencing disorienting dilemmas facing cultural differences and differences in early childhood education practices (Birkeland & Ødemotland, 2018). The attention was focusing on cultural differences, and less on shared problems and ways of approaching such shared problems. When we were meeting digitally, we met on a culturally independent platform, which made people more aware of shared problems, i.e. how to educate

for cultural sustainability and open up in different ways to inspire each other. In this way, the presentations of how to approach and include the local neighborhood in the kindergartens were different examples of how to solve a “joint problem” (Novoa & Yariv-Mashal, 2003).

Fourthly, in our process of preparing and implementing digital workshops, we learned that visual materials and artifacts can act as mediators when facing the difficulties of not being able to meet. Digital platforms have forced us to be more visual and to use examples in presentations to achieve better communication and understanding. We have saved all the materials for not only reflections on actions and for future action planning but also research. We were also inspired to make visual materials and learning resources and use digitalization for ECE master education in both countries.

Finally, digital platforms can also act as social spaces where participants share daily life during the pandemic and encourage and support each other socially in a time of isolation. Keeping the communication going enhances the bonds among participants which results in enhanced resilience. In the digital workshops, the participants showed their appreciation and support to each other when giving comments and feedback. Mutual trust and eagerness have made us more resilient in the time of digitalization.

24.3.1 Looking Forward

How to balance the embedded contradiction of cross-cultural collaboration is an ongoing issue that requires creativity under different circumstances. During the COVID 19 crisis, our project has tried to use digital platforms in innovative ways. A digital platform for ongoing cross-cultural collaboration among main actors in ECE can be a model for future collaboration, not relying on one form of communication but a hybrid one integrating both digital and physical meetings. The collaboration thus can be going on despite the distances. This hybrid communication model also contributes to the sustainability of the environment and the project and enhances the bonds and resilience of the participants. Utilizing visual materials on digital platforms can make it easier for participants of different cultures and languages to understand and inspire each other in a more concrete way. To encourage participants to be more active and critical in digital workshops, it is important to send presentations and give tasks beforehand.

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Chapter 25

Closing Remarks on Innovations and Theorisations of an Educational Experiment



Marilyn Fleer , Glykeria Fragkiadaki , Elin Eriksen Ødegaard ,
Prabhat Rai , and Alicja Sadownik 

Abstract This chapter concludes our book—a book dedicated to the theorisation of an educational experiment but does so in relation to digital methods. The methods presented across the chapters on this book foreground the many ways an educational experiment can be undertaken. The methods are all in response to the societal and global conditions of a global pandemic. Theorised methods bring forward a system of concepts that enable a digital educational experiment to proceed under conditions of crisis, contradiction, and drama. Hedegaard’s writings on an educational experiment, and the new methods presented across the book and discussed in this chapter, bring closure for the concepts of motives and demands in relation to digital environments and interactions, where time, space, and physicality are virtually defined and enabled. Key points for meeting future challenges, dramas, and crises with digital agility are foregrounded in this chapter.

Keywords Digital · Educational experiment · Cultural-historical

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25.1 Introduction

Researchers who have contributed to this book collectively solved the research problem of practice brought about by a global pandemic. In so doing, new activities and cultural practices became normalised within the academy, adding weight to the idea that culture is more than the formation of social life and of the social activity of humans; also, materialistic and biological conditions are added. This was realised through the changing material and digital context of the lived and morphed hologram of the academy. The book truly embodies Bakhtin's idea of polyglossia as PhD students and senior researchers from two continents, Europe and Australia, researched, through digital devices, many more countries (e.g. China, India, USA). We have met on the terms of the English language, but a range of mother tongues have been activated when preparing for engagement in regular digital webinars for sharing, response and discussions. Such a wide range and extensive internationalisation through digital exchange have stimulated, embodied and challenged cultural-historical insights and theorisations.

What we have collectively learned through the process of bringing into existence the dialectics of crisis and innovation, is the capacity we have as humans to generate from these new demands the imagining of solutions that we have shown in Chap. 1 in a crystalised form of a model (Fig. 1.2) that explains our theorising (methodology). This concluding chapter is framed around three key dimensions that have emerged from the stories of the authors as they met the new demands of the crisis. They are:

1. Considerations of ethical dimensions/decisions as cultural-historical researchers
2. Meeting future challenges, dramas, and crises with digital agility
3. Our model as a response (shield) to current and future crisis

These are discussed in turn.

Considerations of Ethical Dimensions/Decisions as Cultural-Historical Researchers

From the position of privilege (economic survivors of the Global pandemic) we have had the resources to bring together researchers from across 3 Centres of research and through equal partnership and twinning across institutions. Funded in Australia by the Australian Research Council through the Laureate Fellowship Scheme (FL180100161), the Conceptual PlayLab at Monash university has been resourced to bring international and localised networking. PhD students and researchers came together to study children's development in the context of a pedagogical model of a Conceptual PlayWorld. This is a planned intervention that was originally developed as taking place within the institutional practices of childcare, preschool, kindergarten, and school, but which we expanded to the families in broad contexts of community gardens, playgroups, and makerspaces. How the educational experiments morphed to meet the demands of the Global pandemic, is reported as new research methods throughout the sections of this book.

Likewise, the researchers from the KINDknow Research Centre for Systemic Research on Diversity and Sustainable Futures, funded by the Norwegian Research Council (RCN-275575) brought together PhD students and senior researchers for twinning locally and across the international milieus. The KINDknow Centre has resourced a series of work projects, which were conceptualised in relation to co-creation with community, NGO's, kindergartens and teacher education in Norway and internationally. The Pandemic created the conditions for innovation through the leadership of the centre, by the Centre Director as well as by the researchers themselves.

At the Aristotle University of Thessaloniki in Greece, a research team is currently being built, a play lab focused on STEM in order to create infrastructure to support emergent new practices in research for the Greek context. During the pandemic, researchers experienced a crisis in diverse research contexts allowing a critical reflection on the dialectics of crisis and pointed to the vital role of staying connected to the research community and continuing international collaboration that generates innovation, resilience, and social change.

Meeting Future Challenges, Dramas, and Crises with Digital Agility

In research, we have an ethical position that we hold as individuals, but also as part of being in a collective research group. In this book, the new innovative practices and the ethical position held by the researchers were made conscious through how the authors discussed the resolution of the problems they met. This was operationalised in two key ways.

First, in the process of bringing forward the new research methods introduced in the chapters of this book, researchers made conscious the demands they were experiencing, which in turn developed a new motive orientation towards innovation. This could have been a negative experience or could have created a sense of hopelessness. However, the common theoretical frame of a cultural-historical perspective created a collective orientation for solving problems to meet the need for continuing the research—but in new ways.

Second, in many of the chapters, the authors described how they worked together to meet the new demands and brainstormed possible imagined solutions. These solutions generated a sense of positivity and respected the resourcefulness of the researchers; we recognised resilient digital agility in the researchers. The process of preparing the manuscript gave researchers a way of realising the elegance and theoretical robustness of their solutions, and this became a temporary cathartic moment that further positively impacted the researchers' well-being. The researchers not only generated new knowledge, but they developed new research methods which this book collectively theorised through the introductory chapter and the section chapters.

Our Model as a Response (Shield) to Current and Future Crisis

Crises such as the Global pandemic, disasters, or violent conflicts and brutal wars present what can be similar to old social situations, as conflicts, disasters, and wars are not new, and historically, this has been challenging for researchers as it presents disruption, hurdles in previous ways of functioning and even danger to lives. What

is new to this situation is the digital agility this group of researchers developed during the years of the Pandemic. To continue to work effectively in these circumstances, researchers were challenged and took action to redesign their existing research methods. The present volume especially engages with the use of digital artefacts, but the use of these artefacts demands a theorisation that captures the dialectical and mutual constitution of the individual and digital. One of the central themes we have explored in this book suggests a theoretical, knowledge-laden and collective response to uncertainty where the use of digital methodology is based on the secure foundation of the cultural-historical theorising of practice. The crisis thus was seen as a moment for new knowledge production. The chapters in this volume have liberally drawn on Vygotsky's theoretical work on crisis and the theorisation of human development. In addition, Mariane Hedegaard's work on the dialectical-interactive approach guided our methodological innovation with an attempt to respond to new demands of research in times of crisis (e.g. Hedegaard, 2008, 2020) and the work where she adds biological conditions to the cultural-historical in order to more fully understand what effects children's development and cultural formation (e.g. Hedegaard & Ødegaard, 2020). In striving to respond to the challenges of the practice in early childhood education sector authors extend and offer a gamut of new concepts e.g. resilient digital agility, collective relational proximity, digital methodological agency, digital collaboration in educational experiments, dis-situation of development and pedagogical innovations. These ideas together contribute to the development of the model presented in the introduction chapter, the attempt is to develop a dynamic and dialectical model that encapsulates the infinite capacity of human imagination and creativity. This is not to undermine the in-flux of political-economic situation in times of crisis that creates new social conditions of labour in the workplace and home settings. Conceptualising digital methodology from the cultural-historical perspective offered researchers an agency to engage with the dynamic and constantly changing 'in-here' and "out-there" nature of reality. One of the unique high points of using Vygotsky's work, as Stetsenko (2011) highlights, is "acknowledging the importance of adopting an evolutionary perspective in understanding human development, yet suggests the model that integrates human agency, self-determination and freedom" (p.26). In the times of a Global pandemic a cultural-historical stance to support the theorising of new research methods (methodology) associated with using digital tools helped to transcend the biological constraints and actualise the potential of human beings; *new relationship to the world* and their *new mode of existence* – realised through *collaborative labour mediated by collectively invented cultural tools* (Stetsenko, 2011, p.26).

In conclusion, we can see in many of the chapters that there are a series of dramas and resolutions depicted. The digital experiences and innovations also brought into practice new ways of being and becoming researchers. The tragedy is not just a moment of one drama of the theatre, but rather an ongoing series of dramas, which each brought resolutions which were crystallised as a new digital research method. There were many revolutions of the drama and resolution dialectic because as one solution was determined, a further drama was realised. Just as Vygotsky and many of his followers have argued, the imaginings become crystallised in reality, and

these, in turn, impact the way people function with new tools, rules and signs in everyday life (eg. Kozulin, 2003). The new tools, rules and signs that emerged from the practices of the researchers initially came about because of a personalised crisis, and our scientific reading of the crisis allowed for methods to be theorised within a methodological frame, as presented in the first chapter of this book.

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