Children's Digital Boundary Crossings When Moving in Between Porous Ecosystems

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Introduction

Children and young people (CYP) are growing up in an increasingly digital society, and research is needed to understand how they navigate and live with ubiquitous technology permeating the fabric of their everyday lives. However, much of what we know about this topic rests heavily on quantitative studies, often from an adult perspective; it is in these perspectives that mainly screen time is measured, while the depth and context of what children do online are less visible (Lafton et al., 2023). We aim to take up the shortcomings in existing studies by adopting a

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qualitative approach focusing on the context of CYP's digital lives. We believe an approach that listens to and includes the voices of CYP is necessary to better understand the digital interactions and social relations taking place in children's lives.

In this chapter, we build on Bronfenbrenner's ecological systems theory (EST), which highlights how CYP's development is contingent on context, here looking at how Bronfenbrenner's (2005, Bronfenbrenner & Morris, 2006) later work refocuses attention on the agency that CYP have. However, Bronfenbrenner's theory was fully developed by the turn of the century (Rosa & Tudge, 2013), so it did not include the impact of digital technology on CYP's lives. Hence, using Bronfenbrenner's theory requires a consideration of the meaning of the situated—or contextual—in relation to an understanding of ecological practices as multilayered, in which participants engage with a material environment (e.g., digital technologies; Aarsand & Bowden, 2021). For instance, the meaning of situated or contextual media can be seen in how various media have long been used to extend educational experiences beyond the classroom, leading to the affordances that networked technologies have and the potential to enable more active participation in the wider world (Burnett, 2011). This participation is facilitated by how digital technology moves children's participation beyond the boundaries of, for example, home or the local classroom. Considering this, we argue that digital technologies allow CYP to span across microsystems, creating mesosystemic interactions in new ways and highlighting the overlapping arrangement of microsystems connected by social interactions (Neal & Neal, 2013).

Although ecological models do not necessarily indicate order and coherence (Carrington, 2013), they can represent how humans interact within and through human bodies in the ordinary micro-practices of everyday life and how "fundamental boundaries have begun to become undone" (Alaimo, 2016, p. 3). Neal and Neal (2013) suggested that the nested ecosystems model initially proposed by Bronfenbrenner (1979) ignores how different spheres of influence in microsystems intersect and impact individual lives. Thus, Neal and Neal (2013) conceptualised the ecological environment as a network of overlapping structures in which the systems are connected to individuals directly or indirectly, transiently or constantly. The result is a shift in focus from a nested to a networked

system (Neal & Neal, 2013, p. 733). In this networked model, the microsystems and mesosystems that appear will rely on the actual patterns of social interactions within the child's life, rather than defining the boundaries and participants in advance (Neal & Neal, 2013, p. 730).

In the present chapter, we take up the idea of viewing the social world as a network emerging across predefined microsystems. In addition to how Neal and Neal (2013) identified mesosystems as occurring when significant persons in the children's predefined microsystems interact, thereby creating connections and dialogues impacting children's lives, we include how children's digital interactions—including significant persons in children's digital sphere—contribute to constructing mesosystems. Furthermore, we are concerned with "*where* individuals interact and towards *how* and with *whom* they interact" and *what* activities were undertaken (Neal & Neal, 2013, p. 733). In exploring these issues, we focus on the following research question: How does CYP's participation in social and digital relations undo and reshape the pre-existing boundaries of their everyday microsystems? How can such reshaping contribute to rethinking (predefined) ideas about what knowledge is of importance?

When initiating the project, we understood the microsystems as predefined and labelled them as family, leisure time, and education. In our analysis, we examined how such microsystems seemed porous in the sense that digital technology undid the pre-existing borders. This chapter questions whether the social interactions of CYP in and across microsystems can produce knowledge that is not yet recognised and considered in predefined learning spaces. In the discussion, we suggest that not only human individuals but also technology take part in the agentic networking of mesosystems.

Inspired by Neal and Neal (2013), we see groups of CYP as a clique. The network concept of a clique has multiple operational definitions and can vary in terms of intimacy and fluidity. In its simplest form, a clique is a set of people in which every member directly interacts with every other member (Neal & Neal, 2013). In our understanding, the clique allows "some potential operational definitions of a setting" (Neal & Neal, 2013 p. 734), where virtual spaces open for larger and more fluid interactions for CYP to interact and construct a mesosystem between family, leisure, and education.

Research on Children's Digital Worlds

Technology permeates family life, leisure time, and education. Like McHale et al. (2009), we also believe the following:

> … daily activities are important influences on development in a range of domains, including [children's] … skills and abilities, their social relationships and behaviour, and their identity development. Indeed, a key concern of media researchers has been on the effects of time spent watching television, playing video games and the like, on [children's] … development and well-being. (p. 2)

Weisner (1989) stated that activity settings are the contexts for action in the everyday routine of life and that culture is instantiated in these settings (Weisner, 1989, p. 14). As the key dimensions of activity settings, Weisner (1989, pp. 14–15) presented what activities CYP may undertake, who is involved in the child's activity, and how the activity is carried out. From an ecological perspective, this serves to help researchers understand the developmental implications of children's digital activities by analysing not only *what* children do "with their time, but *who* participates in the activity, *how* the activity is carried out, and *why* the activity is undertaken" (McHale et al., 2009, p. 2). This understanding is linked closely to the model by Neal and Neal (2013), who proposed a focus on social interactions to show how the various ecological systems are connected, hence shifting our focus away from where individuals interact and instead towards "*how* and with *whom* they interact" (p. 733) in a networked approach.

New technology offers new forms of connecting, and in this context, *who* participate in the activity may be virtually situated elsewhere. Children make deliberate use of different forms of technology to maintain and initiate friendships (Gray, 2018; Merchant, 2012; Nesi et al., 2018; van Cleemput, 2012). Children maintain their real-life friendships with text messages and instant messaging through various channels, and the choice of how and what such communication comprises can be seen as important and convey meaning (Van Cleemput, 2012). Moving from instant messaging to maintaining friendships via social platforms affords

new ways of forming friendships because many of these sites make it possible to see friends online or lists of friends (Gray, 2018). Connecting with online friends or followers is a way of forming new friendships that are digitally facilitated and that can provide examples of a mesosystemic interaction involving relationships that are developed through social interactions in virtual and/or physical space.

Children engage in the digital world through online gaming, but they are active within other affinity spaces emerging from shared interests, such as online fora created by users or influencers (Aguilera & de Roock, 2022). Although younger children mainly take the role of observers in the digital world, they are gradually more prone to start interacting within the affinity spaces or as a response to influencers' content through likes or comments, thus creating content and becoming producers of the affinity space themselves. Again, this may lead to other adolescents responding to them and potentially creating interest-driven online acquaintances or friendships (Gray, 2018).

In the research field on children's digital lives, EST (Bronfenbrenner, 1979, 2005; Bronfenbrenner & Morris, 2006) has been widely adopted to understand the individual in context. For instance, Hong et al. (2016) used the social-ecological framework in their research, focusing on the family, peers, and school contexts in which cyberbullying can be found. Their results showed that strong relationships within these contexts are associated with fewer cyberbullying experiences. On the other hand, Falck et al. (2018) observed that attempts to establish the relationship between digital technology and students' learning often produced a null effect; these authors suggested that, although using some digital technologies in the classroom produces a positive effect, other technologies used by the same students produced a negative effect, so different uses of different technologies may offset each other. This points to the importance of understanding the use of digital technologies and that social actions are shaped by social contexts (Talaee & Noroozi, 2019). Furthermore, Selwyn (2017) warned against imagining the relationship between education and digital technology as straightforward because education and learning are highly complex processes:

> [O]ur primary focus should not be on technological devices, tools and applications per se, but on the practices and activities that surround them, the meanings people attach to them and the social relations and structures that these technologies are linked to. (Selwyn, 2017, p. 2)

Thus, the importance of what activities are undertaken, who is involved, and how the activity is carried out is crucial in furthering our understanding of such highly complex processes. Neal and Neal (2013) suggested identifying microsystems by looking at children's actual social interactions rather than predefining them. In our networked EST model, we have held onto the idea of family, leisure time, and education as the three main areas for our microsystems. *Who* is taking part in the microsystems may not be known in advance. The idea of mesosystems as occurring when significant persons in the children's microsystems interact (Neal & Neal, 2013) implies that a YouTuber or an influencer may be a significant person. A question we will bring with us into the discussion in this chapter is whether the relationship between an influencer and a follower can be understood as an interaction considering that the child takes part in a fluid, larger community of followers while the follower might feel a strong connection to the influencer and either observe, click "like", or comment without the influencer actively noticing these actions. In using a networked (Neal & Neal, 2013) as opposed to a nested model (Bronfenbrenner, 1979) of EST, we not only understand the complex learning process taking place but also "examine more complex relationships among ecological systems, including a multiplicity of different microsystems that only partially overlap, and mesosystems…that bridge these microsystems" (Neal & Neal, 2013, p. 733).

Much of the previous work on peer experiences originated from the idea that CYP's experiences on social media simply mirror—or reflect—their offline experiences. The mirroring framework fails, however, to acknowledge how *context* comes to matter in transforming and shaping relationships (Nesi et al., 2018). We expect to see an overlap in online and offline peer relations (social relations), both regarding who is participating and how they participate, but the difference in contextual factors contributes to the complex role that the online environment plays in CYP's online experiences. Paying attention to how the online

environment contributes to porosity across the boundaries of ecosystems helps us move the discussion forward about how online social relationships may be of great importance.

Methodology

This chapter reports on three different qualitative datasets collected in the DigiGen project. Although the research occurred in several countries, this chapter only reports on Norwegian data. More specifically, we report on data collected from the initial predefined three microsystems in which children interact in their daily lives: family, leisure, and education. In our methodological design, CYP's experiences in research have been prominent. We have made an effort to acknowledge that their voices tell us how they experience their digital lives.

Sampling, Procedure, and Ethics

Recruiting CYP for the study was done through schools, kindergartens, and social media channels connected to Norwegian universities and our national stakeholders. We shared calls for participants through social media channels aimed at various groups (e.g., educational institutions, teachers, parent and youth groups, etc.). The research team also sent informational emails to Oslo Metropolitan University's 151 partnership schools and an additional 35 schools in the eastern region of Norway. Parents who already knew about the researcher or the university or parents with a special interest in digital technology contacted the Norwegian research team. To supplement and have enough participants for all three datasets, the Norwegian research team also used personal and professional networks, leading to a snowball sampling approach. A disadvantage of snowball sampling is the risk of recruiting a homogenous group of participants (Browne, 2005). In this case, however, the sampling resulted in a diverse selection of participants from urban and suburban areas with diverse cultural, socio-economic, and educational backgrounds.

Table 1 Overview of methods and participants

Methods	Number of participants	Age group/ role
Semi-structured individual interview with family members (family)	7 children	Children aged 8–10
Focus group interview (family)	18 children/5 focus groups	Children aged 8–10
Individual interviews (education)	11 children	Children aged 12–13
Individual interviews (leisure)	13 children	Children aged 9–15

We gathered the data (see Table 1) reported on in this chapter between December 2020 and November 2021. The data collection focusing on the family domain includes data collected from children between 8 and 10 years of age. These data include ten focus groups with children and ten family interviews[1] (for more details, including interview guides, see Kapella et al., 2022). The dataset focusing on leisure includes 13 interviews with CYP between 10 and 15 years of age (for more details, including interview guides, see Parsanoglou et al., 2022), while the education data include interviews with 11 CYP, who were interviewed twice, once in May 2021 and again in October–November 2021 (for more details, including interview guides, see Eickelmann et al., 2022).

The work in the project was divided into several focus areas namely: (1) family—included individual interviews (mainly face-to-face, with only one family interview conducted via Zoom) and focus group interviews; (2) leisure—included individual interviews conducted via Zoom; and (3) education—included two rounds of interviews with the same group of CYP conducted via Zoom. Using Zoom for the interviews allowed the CYP the flexibility to decide where the interview would take place, with most choosing to be in their own bedroom. This made the interview situation for all our participants comfortable and familiar, and the use of Zoom allowed for easier recording of the interviews and less

[1] The individual family interviews were organised with at least three members of one family, in which one interview participant was a child between 8 and 10 years of age. The other participants included at least one parent and a sibling or another family member. In this chapter, we are only reporting on the data from the child.

time to be consumed in terms of travel and organisation for everyone involved. In all the interviews, the researcher interviewing the CYP was conscious of the responses provided, aiming to respect their opinion; the researcher was highly focused on the role of CYP as experts in their own lives (Vogl, 2012). The interview structure for each dataset was the same for children, young people, and adults to compare the different perspectives, but the interview style was adjusted for the participants.

Given the young age of some of the children, both family interviews and focus groups were organised in a safe and familiar peer environment. This was seen as important to replicate a familiar and real-life setting for the children involved. Focus group interviews were used especially for the youngest participants because they were seen as important in contributing to an interactive discussion between the individuals and allowing the researchers to capitalise on the group dynamics in the discussion (Krueger, 1994). Triangulation of data across microsystems was applied to understand how CYP's participation in social relations undoes and reshapes the pre-existing boundaries of their everyday microsystems.

We received ethical approval from the Norwegian Centre for Research Data, ensuring that our data are collected, stored, and shared safely and legally and that all GDPR requirements are followed. The parents/caregivers of the participants provided written informed consent. Even though it was not mandatory or legally binding, the CYP were given the opportunity to sign an assent form, in addition to the consent given by their parents/caregivers, to show them that we took their willingness to participate seriously. Cocks (2006) has noted that the process of seeking assent is a valuable method for securing the agreement of children who may not have the competence to consent, but Cocks acknowledged that it is not in itself sufficient and should be just one approach available to researchers operating within a framework of *ethical reflection*. For the three authors of this chapter, this meant the following.

Seeking assent requires the researcher to remain constantly vigilant to the responses of the child at all times: it is not something gained at the beginning of the research and then put aside. It requires time and constant effort on the part of the researchers, who need to attune themselves to the child's unique communication and know when to remove themselves (Cocks, 2006, pp. 257–258).

Analysis Strategies

After completing the data collection, the data were transcribed using the same transcription key for all interviews (individual and focus group). Once the transcriptions had been completed, the transcription files were deidentified, and pseudonyms or identification numbers were given to each individual and each focus group. We have chosen to use CYP to identify all our participants in this chapter, regardless of which microsystem the data were extracted from. Our argument for doing this is found in how Neal and Neal (2013) argued that microsystems cannot be defined in advance.

Individual research teams initially analysed the data, and the data were then reanalysed by the authors of this chapter with a specific focus on '*where* individuals interact and towards *how* and with *whom* they interact' and *what* activities were undertaken (Neal & Neal, 2013, p. 733). In the analytical process, we focused on how the microsystems facilitated social interactions that can 'help clarify how ecological systems are connected' (Neal & Neal, 2013, p. 726), hence showing how these systems are porous as opposed to being nested (Bronfenbrenner, 1979).

Our analysis followed a stepwise thematic analysis approach, following the six-step framework of Braun and Clarke (2006). This was done in two phases (Tjora, 2019), with phase one done individually by each author and phase two carried out collectively. Through our thematic analysis, we aimed to construct themes and reframe, reinterpret, and connect data elements across the three microsystems. According to Braun and Clarke (2006), researchers can employ an inductive or deductive approach to theme identification. Our analysis used an inductive approach (Thomas, 2006; Tjora 2019), which tends to provide a broader and more expansive analysis of the entire body of data. In the first step, each researcher focused on their dataset by becoming familiar with the entire dataset. This step entailed repeated and active reading through all the data for their microsystem and noting initial ideas (Braun & Clarke, 2006). In the second step, each of the authors began coding interesting aspects of the data systematically, collating data relevant to each code. Finally, in the third step, we used the joint analysis table (see Table 2 with

Table 2 Joint analysis table (excerpt example from the three focus area datasets)

Focus area	Citation/extract from material	Where	How	With whom	The microsystem facilitating	Added by researcher
Leisure	Why the child is so good at an online game: 'I have played it a lot, and maybe seen some other YouTubers who play and give pointers'.	Leisure	Watching and learning from YouTubers/ influencers	YouTubers and often peers	Family access to computer and Internet, schools through school pc	Author 3
Family	My dad set up the Discord server so that me and my friends could game together. Ole and I and Kåre were in the same **party**[a] as one kid from my class, and then, he was a **party leader**. He didn't want to **kick us out**; he wanted us in the **party**, but he said bad words. Then, we could **leave** the Discord group, and then, I created a new one and could **invite** them so they could **join** me.	At home	Father sets up a server to allow for gaming	Gaming with a group of friends	The family provides support to set up discord and leisure facilitates the gaming	Author 2

(*continued*)

Table 2 (continued)

Focus area	Citation/extract from material	Where	How	With whom	The microsystem facilitating	Added by researcher
Education	There are some in my class who are really good when it comes to digital technology. They are really good because they use it in their spare time. I have a couple of friends who are interested in building PCs, and they learn how to do it by watching on like YouTube. They can probably connect things together when it comes to using this in school. Also, if you do something in a game and get into a kind of similar situation in real life, then maybe you can try to do that. Like me, I'm now really good at English and English grammar from gaming.	School	Learning from peers or YouTube how to do things. Learning from gaming to being good at school subjects	Peers and those in the gaming world (other gamers who speak English) and those producing videos	Leisure and school	Author 1

[a]Words in bold were English words that the participant used when speaking in Norwegian. This shows how the English words that are used when gaming influences the Norwegian language

an example excerpt of data from each focus area) to collate codes into potential themes, gathering relevant data for each potential theme.

The second phase involved looking for theoretical connections and emerging themes across all three datasets. In this phase, the joint analysis table was important because it was used to organise the data according to the network model by Neal and Neal (2013), which includes not only analysing *what* children do but also with *whom* they participate and *where* and *how* this participation takes place. This allowed us to look collectively at the data instead of focusing on individual microsystem data. Thus, the collective work in the second phase of step four involved two levels. Level one involved a check of whether the themes worked in relation to the coded extracts and the entire dataset. In level one, we collectively reviewed the coded data extracts to ensure that they fit with each theme and formed a coherent pattern (Braun & Clarke, 2006). Kiger and Varpio (2020, p. 6) suggested asking the following questions in step four: Does each theme have adequate supporting data? Are the included data coherent in supporting that theme? This set of questions was also relevant for level two, where we needed to decide if the themes meaningfully fit with the dataset and what Braun and Clarke (2006) called the thematic map,[2] which helped us see how the themes were interrelated within and across the three datasets. This involved a collective process in which we reread the entire datasets to re-examine the themes and recode additional data that fell under any newly created or modified themes in this step. In step five, we continued the analysis to refine each theme, creating an understanding and narrative description of each theme, including why it is important to the broader research question (Braun & Clarke, 2006; Kiger & Varpio, 2020). Finally, step six involved writing up the final analysis and describing the findings presented in this chapter.

We believe this resulted in a better understanding of how the different microsystems intersected and impacted the everyday lives of CYP. Through our analysis, we have uncovered networks of overlapping structures. Furthermore, this analysis helps understand how CYP can span across

[2] According to Braun and Clarke (2006), a thematic map is similar to a codebook and involves a detailed account of the hierarchical relationship between codes, a description of the criteria, and examples.

microsystems, creating mesosystemic interactions (Neal & Neal, 2013). As such, this "shifts the focus of attention away from *where*… [CYP] interact and towards *how* and with *whom* they interact" (Neal and Neal, 2013, p. 733).

Findings

In this section, we explore what the children told us about how they crossed several microsystem boundaries in their everyday lives. Although the cross-section of data includes what initially was labelled family (home), leisure, and education microsystems, we will not present these separately. We instead focus on how these microsystems are interconnected and overlap, leading to mesosystemic interactions. Our findings section is organised under headings referring to where the children were and with whom.

Being at Home "Alone"

Our first focus is on how the children explained their interactions and with whom they interacted. As mentioned earlier, the *who* in children's processes of constructing meaning can be present in real life, but they can also be digitally present. What we did see in the data is that the children seldom expressed that they were alone when using digital technology but that this could happen. Having digital technology at home means they can access information, for example, about their homework.

> **INTERVIEWER**: Yes. Do you use the iPad for schoolwork at home?
> **CYP**: Yes, if I have … Right now, I have math homework where I have to work 30 minutes on such a math website. And I have access to our weekly plan digitally. So if I'm wondering what I have to do in homework and stuff, then I can check there.

The children also used digital technology to follow their learning interests. In the following extract, we can see that learning and how technology outside of the classroom provides learning support, which was described in a very broad sense.

> **INTERVIEWER**: Is there anything you use at home that you don't have access to at school? For instance, apps and such that you think you're learning from?
> **CYP**: I'm kind of fond of watching geography videos, documentaries, and such. It's kind of like, I don't watch it that much, it's not like I learn a lot from it, but sometimes, I think it's kind of fun to watch science videos and geography videos like that and stuff on YouTube. In my spare time, at home, to get better at things that I'm interested in, I use YouTube for quite a few different things, then. So if there's anything I … if there's something I don't understand, then I often end up with YouTube or Google. But you must be a bit critical of sources and such, then. Then, it's okay, really, then, I also think it's okay if it's something like school related or something really important or not very important, but something like, where other people are going to see it, or I'm going to pass it on to others, then I can also just ask a teacher or my parents.
> **INTERVIEWER**: You are saying that you use YouTube very much and such. Is the teacher using it in teaching as well, or is it primarily when you are at home working on something that you are interested in?
> **CYP**: Mostly it's at home, for … not just school stuff either, but for things that I don't understand and things that I want to be good at and that I'm a little interested in then that I want to learn a little more about. But there are some; there are very good people on YouTube as well. We have a teacher who usually puts on, or doesn't usually then, but once in a while puts on videos from YouTube, like, teachers explaining, then. This explains very well … One named teacher Ingrid, among other things.

This child explains how (s)he actively searched for content on YouTube linked to something (s)he wanted to know more about or did not understand. The content could be linked to school or leisure, but the CYP's interests, access to technology, and websites like YouTube took part in the agentic networking of learning. Moreover, even though the child described this as an activity without other people involved, for example, the teacher from their school, Ingrid from YouTube, and other people

that (s)he may share the content with can be seen in the description. Other children told similar stories:

> **INTERVIEWER**: But at home when, if you are going to learn something new or, if you are interested in maybe some hobby or something that you do not quite know how to do, or … Do you use YouTube?
> **CYP**: Yes, because then you can see how things work and how they do things, and then, you learn from it.
> **INTERVIEWER**: Is it someone you follow, for example, on YouTube or?
> **CYP**: Yes, I, that's the way it is, some YouTubers that pretty much all the guys in the class like, and there are more YouTubers. But we mostly follow one YouTube channel called Mikal, but the guy behind the YouTube channel is Dennis Vareide.

In this extract, the child pointed out how he and his friends used YouTube to seek out new knowledge. The learning strategies involved YouTube, peers, and the teacher, even though they were not physically present. In addition, platforms like YouTube and Google can support CYP to become better gamers.

> **CYP**: I have played it a lot, and maybe seen some other YouTubers who play it and give pointers and stuff like that … usually, I watch a person named Wisk, I watch him sometimes.
> **INTERVIEWER**: What about Minecraft, do you Google it?
> **CYP**: Yes, I have sometimes … Google and YouTube to learn how to make it.

For many of the children, YouTube seemed to be a source of information not only for schoolwork but also for learning other interesting things. For example, the children in our empirical material stated that they learned from those who already had experience with a game, but they did not have to be in the same place at the same time. Thus, in this case, YouTubers became important to them because they had access to knowledge that mattered to them. Another child pointed to the added advantage children have, here emerging from their digital technology use

outside the classroom. The child started by explaining why some kids get "better" at technology use than others:

> **CYP**: Because they use more technology in their spare time. They might be watching … I have a couple of friends who are so interested in building PCs … and, yes. Then, they can like look at it, and they can probably learn … how to do it. And then they can probably tie it together a little bit … You learn a lot of English from it (gaming). But now I've sort of learned … everything they say or everything they say, everything that's there, so I don't get very much out of it except entertainment … But you can also use that, if you do something in a game, and then, you get that kind of similar situation in real life; then, maybe you can try to do it, then … For example, I'm learning English, and then, I'm learning. I've learned some grammar like that. Just watching videos and seeing how others are using them.

For this child, using digital technology outside the classroom contributed to several things, such as knowing how to build a computer (technical knowledge), learning English, and even transferring knowledge to real life. This means that the more time you spend with it, the better you get at it.

To summarise this first section, the children used digital technology at home "alone". Being alone may not mean being alone in the house, but they were alone when they connected to online sources. They actively searched for content that interested them and content that could be relevant or useful for school subjects, but also for gaming or other areas that interested them. The people they watched online, like teacher Ingrid or YouTuber Dennis Vareide, became important to them and were essential in providing information and knowledge.

Being at Home Connecting with Peers

What children have acquired in one setting can be useful in other places, such as education. For example, the children explained they needed help understanding and using the digital equipment and software during the

COVID-19 lockdown period (2020–2021), a time when they had home-schooling.

> **CYP**: Then, we tried our best, and those who are here at home during as then … have been even longer in home-schooling or home office than we have been, they knew a little more about the PC then than I did, so I got good help from there.

Gamers and those who spent more time using digital technology outside of school and had more interest were described as "better" because they were seen as having certain advantages and could offer support to their peers.

> **CYP**: So some in my class are a lot better than me at all this stuff here with iPad and data and stuff like that. But I would say that if the teacher has explained what to do, I can do it. And if I can't do it, I'll get help.
> **INTERVIEWER**: Yes. Why do you think others are better than you? What do you think is the reason for that?
> **CYP**: Some people spend a lot of time gaming and other digital things. And who just simply like it more.

The CYP returned to the importance of interest and experience when it comes to becoming good at something. At the same time, the child above highlighted that (s)he could probably do it as well if it were explained in more detail. Platforms set up by the school, like Teams, were used across a range of microsystems for communication, and the children told us how they did not need to call their friends on the phone because they had them on Teams. Communication and the behaviour linked to it can be seen as contributing to the porosity of the microsystems. In one of the focus group discussions, the children described what happened when Office 365 was introduced as the learning management system (LMS) in a school and the children, not the teacher, discovered the chat function:

> **CYP**: And then, we could message each other, you know, without the teacher being aware of it. They did detect it after a while, though, because someone reported it. And now, they have shut down the opportunity.

In this example, a class group activated the chat function of the LMS, and they knew that the teacher did not know they did it. When it was discovered, the teacher shut down the function because it "became too messy and caused problems in class" (CYP). Other groups of children also reported using Teams for talking while gaming:

CYP: Yes (…) on Teams. And I play Minecraft on my school iPad.

When connecting online with peers, the children were not together in real life, but they still treated these online relations as important as those taking place physically. From our data, the children connected online to do schoolwork or to chat with friends from school. However, gaming as an activity was something that the majority of our informants said they did together.

CYP: I kind of like playing Minecraft, and I play some games that Supercell[3] has made … such as a strategy game. It requires you to be good at it. It's not just hoping that you win; you have to be good at the game to move forward. It is not just to be lucky.

For this child, aged 12, gaming during his leisure time shows how interaction with peers through an online game also led to the development of strategic thinking skills. Another skill they developed through gaming was English because they used the language to include gamers who did not speak Norwegian.

INTERVIEWER: And when you play together, do you speak in Norwegian or English or is it a bit of a mix?
CYP: We speak Norwegian if it's just us … If someone doesn't speak Norwegian, we speak English … you have to read quite a bit of English in a lot of games, and your English then gets better.

[3] Supercell is a game company based in Helsinki, Finland. It was launched in 2010 and has developed games like Hay Day, Clash of Clans, Boom Beach, Clash Royale, and Brawl Stars. The idea for the company was to develop cross-platform gaming services—games that you could log into and play from any device.

This child explained how (s)he got better in English through gaming, and across our datasets, we have found that a majority of the children mentioned how gaming contributed to language learning. In our data, we also saw how CYP made their own rules on how to behave and what was acceptable when they were online. For instance, a group of 9-year-old gamers talked about how they regulated what they saw as acceptable behaviour when playing Fortnite. Equally important to how these boys decided rules and what was acceptable behaviour was how the father of one of the boys set up the Discord server to allow for this group of boys, who were former classmates, to continue playing together, even though one had moved away to another municipality.

INTERVIEWER: Are there times when people do dumb things while gaming, bullying, or saying ugly things?
CYP: Not really bullying, but like one guy, he says nasty words and mocks others.
INTERVIEWER: So do you sometimes kick him out of the game? What if he is the party leader (host of the party)?
CYP: If he is the **party leader,** then we just **leave**, but if one of us is the **party leader**, then we can kick him out. We can also **leave**, and then, I can **invite** the other two friends to **join** and not him. He wants to play with us, and he is in our class, but we have said that if he says nasty things, we will have to kick him out. When we make a mistake, he just curses and things, and then, we have to kick him out.

The bold words in the quote above also represent English words mixed in with Norwegian when talking about the game. This shows how digital technology can influence communication and the Norwegian language. It is interesting to see how the boys addressed bad language in their group and how they found the best strategy to avoid it. For this group, they decided to push the last member out if he would not listen when they asked him not to use such words. However, other groups that game online seemed to accept a certain communication style, even though they thought it was inappropriate.

CYP: The best way to describe it is by a word I really shouldn't say.
INTERVIEWER: You can tell us.

CYP: It starts with an r. It's an English word. You shouldn't say it at all. (..) R-e…R-E-T…
INTERVIEWER: ret…ret..
CYP: Yes, you're saying it.
INTERVIEWER: Oh, you're using retard in that fashion?
CYP: Yes, so … we are really weird. We tone it a bit down; instead of saying retard, we say 'rebarb'.

Although admitting that this was the common way they spoke to each other, this group of gamers also acknowledged that this communication style might be seen as inappropriate. This was visible when the informant was reluctant to say the word aloud and progressively spelled it out for the interviewer to understand. Through this rephrasing, they developed a code that the group understood and a way of masking the actual content, which they explained was a way of 'toning it down'.

Being at School

Some of the children told us that the teachers also used platforms like YouTube as a strategy in their teaching, a fact that seemed to contribute to connecting online actors to human actors as significant people in the children's lives.

CYP: Teachers sometimes use it to explain, because … there are YouTube videos of, for example, how to do the multiplication tables and stuff. And the same in English, if one is going to conjugate verbs and nouns, then some YouTube videos show it quite well. So we sometimes use it.

The learning strategies involved YouTube, peers, and the teacher, urging the children to look beyond the classroom and the teacher to develop new learning spaces, both in and out of school.

INTERVIEWER: You talked a little bit about YouTube. Do you sometimes use YouTube to teach yourself something new?
CYP: Yes, at school, so we, for example, in arts and crafts, if we are going to make some paper gadgets or draw something, then we use it often. And

> if we're going to teach some math stuff, a way to do the math, if teachers can't explain it, then we use that too … If you learn things from the teachers, that is, you can learn more things on maybe YouTube because there are more people than one teacher.

This quote shows that the child understood that knowledge can come not only from a single teacher but that other people might also know more about a subject. The children clearly understood the possibilities from platforms such as YouTube or Google, but simultaneously, they might not necessarily question the quality of the content. On the other hand, the students and teachers related to locally produced content, that was not necessarily shared online. In addition, the notion of *more people* indicates that they were oriented towards more than one YouTuber. The children negotiated, collaborated, and worked together when using digital technology, but at the same time, they did not always follow the rules.

> **INTERVIEWER**: You said that you work on writing assignments in some subjects on your laptops. What else are you doing on it?
> **CYP**: So sometimes we play a little bit.
> **INTERVIEWER**: What are you playing at school, then?
> **CYP**: So it depends a little bit, really. We're not allowed to do that, so we must watch out, but yes. We play maybe most like the Minecraft Education Mode. That's what we mostly play.
> **INTERVIEWER**: Do you use Minecraft Education at school for anything other than when you play without being allowed to?
> **CYP**: We use it occasionally in science. In Minecraft Education, you can get that kind of oxygen blocker and all those elements there. And then you can make, for example, water and you can make all sorts of strange things, then, like in the real world. That's what we used Minecraft for, and it's fun.

Games can support science learning, as shown in this quote. However, the quote also includes some ethical dilemmas for the children when they gamed on sites and arenas that they knew they were not supposed to. Other channels that the teachers had less control over but that affect the class environment were social media, such as Snapchat. With this platform, both the home and leisure environments brought about an influence, which often spilled over to the school environment. For example,

one of our participants pointed to the rough tone mentioned about a class chat on Snapchat, which the teacher did not have access to and which could be challenging in an educational setting:

> **CYP**: The environment there among the boys, it's very really quite rough, because we talk pretty badly to each other. But then—we've gotten used to it by then, so we sort of realise that you don't mean it probably.

During the data collection, it became clear that the municipalities in Norway provided children with laptops or tablets, which supported them in doing their homework and continuing communication and learning outside of school. Their home was an important learning environment, and the children shared with us how digital technology creates porous boundaries between the home and school microsystems.

> **CYP**: Everyone in the entire municipality gets their own Chromebook.
> **INTERVIEWER**: Yes, and you can take it home, too, right?
> **CYP**: Yes, we bring it home, and it's for doing homework and stuff like that … and it's much easier to send messages to the teacher or that the teacher can share documents and such.
> **INTERVIEWER**: How does digital technology help you with school?
> **CYP**: Sort of you can share documents and stuff. That's if we do group work and we have an app like that my teacher puts out our weekly homework schedule and stuff on Google Classroom. We can then share our homework assignments as we work outside of class.
> **INTERVIEWER**: When you are working on a homework assignment and get stuck, who do you ask to help you?
> **CYP**: Either my teacher or my learning partner, or I can ask my parents or even search online.
> **INTERVIEW**: What … what kinds of things are you searching for online, or what are you stuck with when searching online for answers?
> **CYP**: If it's sort of … sometimes there is no answer for you from others or difficult math problems ….

Digital technology available at home can mean that children have access to teachers and their classmates outside of school, but they can also get help from parents with schoolwork when at home. As shown earlier, they

even got answers to complex problems from various actors online through websites or YouTube.

The digital environment means that schools are no longer the only place for learning new and perhaps even more challenging things like coding. This also shows how parents and other family members can understand and support digital expertise, which is not unlike supporting children in other nondigital activities, such as playing the piano or doing sports.

Discussion

The digitalisation of society, including education, has contributed to significant changes in cognition, perception, and human activity where, for example, the teacher is no longer the main facilitator of knowledge development (Macleod & Sinclair, 2017). As shown in the analysis, the effects of digitalisation mean changes in how and with whom CYP interact to form mechanisms of continuous learning. In addition to how Neal and Neal (2013) identified mesosystems as occurring when significant persons in the children's predefined microsystems interact—thereby creating connections and dialogues impacting children's lives—our analysis shows how *children's interactions have contributed to constructing mesosystems that include participants who could not have been foreseen*, shifting our focus away from where individuals interact and instead moving towards "*how* and with *whom* they interact" (Neal & Neal, 2013, p. 733). More specifically, children's networks of peers create diverse mesosystems through the porosity of the boundaries in the previously predefined microsystem: family, leisure time, and education (Bronfenbrenner, 1979). When we examine this situation in light of some of the examples presented, we can see a whole world of dialogue, meaning-making, and discussions of content that teachers and parents do not have access to because CYP connect with the online world.

The children discussed YouTube teachers, gamers, and peers they did not necessarily know in real life with their closest peers, but they seldom mentioned discussing how teachers or parents influenced them. Access to online sites became important among peers because they had access to

knowledge and content that mattered to them. The networked nature of CYP's digital environments described in the analysis serves to uncover how microsystems represent a range of digital networks and actors involved that ultimately shape learning outcomes, serving to question how parents and teachers relate to these mesosystems emerging between CYP's offline and online worlds. The children themselves explained how they learned English, strategic thinking, and social norms through their online environments. The teacher and the school can no longer be seen as the single influence in CYP's knowledge development, but peers and others, exemplified here by YouTubers, have started participating in developing new knowledge. When looking at how the children explained their interaction online in their leisure time, as exemplified by the foul language or how they had to construct strategies to shut others out of their community, it may be of interest to discuss whether a school—as an arena for all children—should address what happens outside of the educational site and give children the space to discuss what effects online behaviour, exclusion, and foul language can have.

Our analyses have demonstrated a porosity creating microsystems that are not known in advance. These porous systems also contribute to establishing diverse mesosystems, affecting the sites of learning and development for CYP. One example is how they related to language. In the Norwegian curriculum, so-called metalinguistic awareness is part of CYP's linguistic development, meaning the students can adapt their language to the context, the message, and the recipient (Ministry of Education and Research, 2017). In our material, the CYP described their ability to change between languages in their online conversations and their communication styles. CYP reported the ability to move seemingly effortlessly between Norwegian and English based on the needs of the participating actors in the clique. The need for English was evident in cases where the clique spread worldwide. Most of our informants also tended to mix English vocabulary from the gaming arena into their Norwegian spoken language, conjugating them according to the Norwegian language system as they used them in sentences. This suggests that CYP often participated in mesosystems in which English appears as a natural language of communication. The children did not give us a single example of teachers taking advantage of their English language

skills acquired through gaming or other digital content. Brevik and Rindal (2020) questioned the consequences of such a situation when children today access English through channels other than their teacher in a school and how this might affect the subject of English in school. Nevertheless, our data suggest that digital technology influences communication and the Norwegian language, which the school must consider regarding language development.

The importance of language is also apparent regarding the style of speech or culture within different mesosystems. Although some informants saw a rather rough way of communicating as normal and not to be taken seriously, others reacted to rough communication and reported it to avoid being subjected to it. Such strategies could include leaving the clique or mesosystem or excluding the participants who behaved inappropriately. Following the key dimensions of activity settings (Weisner, 1989), we can see how the "cultural scripts" have been incorporated into the activity. The children explained how they negotiated cultures of inner justice and developed knowledge of what might be seen as inappropriate. At the same time, there was a gap between CYP who strove to avoid this communicative behaviour, and those who interpreted it as not being taken seriously. Even though McHale et al. (2009) presented how researchers can understand children's digital activities through *how* the activity is carried out and *why* the activity is undertaken, a challenge arises when the research literature has provided little insight into the *how* and *why*, leading us to question how and where CYP are socialised into these cultures. Our analysis shows that such socialisation happened at all the sites where the children had access to online communities.

CYP show knowledge and skills in setting boundaries for what they accept to be part of and how to tune their communication styles when moving between different cliques. When this kind of communication spills over into channels provided by schools or accessed by teachers, the swift reaction seems to be to close it down and limit children's access. On the other hand, this does not make the various forms of communication disappear. Instead, these forms may migrate to other available channels. This may mean that the affordances offered by networked technologies to enable more active participation in the wider world (Burnett, 2011) might lead to a missed opportunity for teachers if these experiences are

not discussed. Our question, however, is what consequences emerge when parents and teachers are not engaged in these arenas. The children developed their moral guidelines in online meetings, and, as mentioned by one of our participants, they also translated their experiences into their everyday lives. As mentioned by Aarsand and Bowden (2021), children build action by drawing upon their own and others' previous experiences as they engage with digital technologies that encompass the knowledge of predecessors. They simultaneously create peer cultures originating from a microsystem like education, as shown when the children in the current study told us about the communication channels available through their school as important also during leisure time while they were simultaneously gaming on other devices. In these environments, children get access to predecessors through YouTubers and peers, but they do not necessarily get access to environments where they can critically discuss and examine their strategies. This opens up several thoughts on how mesosystems function as social spaces that may be inflected by the multiple discourses that pattern children's interactions. These discourses emerge both in official spaces and in what has been termed *counter-spaces* (Lefebvre, 1991), which represent different values and relationships, or *third spaces* (Soja, 1996; Wilson, 2003). CYP's networked mesosystems seem to be a third space, representing values and practices of justice developed by children but with very little involvement from teachers and parents.

Although the organisation of activities into specific microsystems may represent certain ideologies, Lefebvre noted that space, as experienced, may be less easily demarcated: "We may say that every spatial envelope implies a barrier between inside and out, but this barrier is always relative, and, as in the case of membranes, always permeable" (1991, p. 176). Our material has shown the children willing to share their ideas and strategies but no narrations of how adults contributed to such discussions. The question is whether children are more advanced in establishing permeable mesosystems than adults. Seeing this in relationship to what Falck et al. (2018) observed that attempts to establish the relationship between digital technology and students' learning often produce a null effect in the classroom, initiates a discussion about how to work with digital competence in education. According to our participants, it was not solely

about using technology in teaching, but just as important was how parents and teachers were becoming aware of children's experiences and learning outcomes across their digital networks and how these competences can be included in the educational programmes, which we only saw very few examples of in our material.

Some of our informants reported playing Minecraft on school devices outside and within school hours without their teacher's knowledge, hiding it from them during school hours. Although some online games can offer ways of communicating while playing, others do not. Burnett (2011) presented knowledge of how children's social interactions offer alternative ways of being and so perhaps produce a different kind of classroom space from that intended by the teacher. Although opportunities may be sought to connect classrooms to other places and people, the kind of space produced through such interactions (as shown by Nesi et al., 2018) may be shaped by the kinds of spaces (and associated activities) that already exist. The question is whether such fluid relationships between classrooms and other spaces may threaten well-established teaching and learning strategies that are well known to teachers and parents, hence offering a different dimension to children's development. Alaimo (2016) asked, "What forms of ethics and politics arise from the sense of being embedded in, exposed to and even composed of the very stuff of a rapidly transforming material world" (p.1)? We find this question highly relevant regarding mesosystems evolving through the porosity of well-established microsystems.

Concluding Remarks

Using a networked model of EST can contribute to understanding the complex learning process in peer relations when they create hybrid mesosystems between the established microsystems family, leisure, and education. By examining more complex relationships among ecological systems, we found that the children navigated and constructed online and offline cliques. However, ethical and political questions can emerge when parents and teachers do not know what learning outcomes and

moral strategies children are developing in and through their mesosystems. Furthermore, there seems to be a lack of arenas to discuss and share children's experiences because possible channels are, as one of the children said, "shut down" if the grown-ups find the content inappropriate. Our findings suggest that children and young people find channels to develop content and communicate in their everyday digital lives. The social interactions of children and young people in and across microsystems produce knowledge that is not yet recognised and considered in predefined learning spaces. One of the consequences when teachers and parents do not participate is that they become unaware of the mesosystems developing through children's networking. These findings call for greater involvement from significant adults in children's digital lives.

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