Technical Mediation of Children's Onlife Worlds

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1 Blurring Children's On- and Offline Worlds

Increasing numbers of children and young people from across the world are engaging in speedy communication which takes place through interactive media devices. Present-day technologies enable the distributed production and peer-to-peer circulation of advanced audio-visual designs and bits of information across different geographical areas—the prediction being that by 2025 every child and young person in the planet will have daily access to the Internet at a speed of 1 MB per second (ITU, 2019). Numerous digital solutions have also been taken into use across the world, as to mitigate the problems created by school closures during the recent COVID-19 outbreak.

Much research has explored the role media and digital technologies play in everyday lives and learning of children and young people, inside and outside of school (cf. Kontopodis et al., 2019; Kumpulainen & Sefton-Green, 2014; Pachler et al., 2010; Selwyn, 2013). Terms such as the 'net generation' (Tapscott, 2009), the 'App generation' (Gardner & Davis, 2013) and

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'networked teens' (Boyd, 2014) have been introduced to describe a radical shift in the lives of the children and young people in the new media era.

While the first wave of relevant scholarship mostly explored online learning, communication and gaming, a second wave of research argues that the boundaries between life online and life offline are increasingly blurred, to an extent that the original meanings of the words online and offline seem to be diffused, both in theory and in practice. Luciano Floridi (2014) introduced, in this frame, the term 'onlife' to account for the contemporary ways of living in which humans are endlessly surrounded by smart, responsive objects when they play, shop, learn, entertain themselves and conduct relationships or even wars. Being 'onlife' is indeed a fundamental dimension of the everyday lives of children and young people—particularly of those in North-Western urban settings, as doing things online and offline is merely a matter of swiftly switching between the different modalities of everydayness. At the same time, it seems that media scholars are moving from a focus on so-called new media to exploring how older and newer forms and means of communication and learning may be intertwined (Debray, 2000; Jenkins, 2006; Leander, 2008).

Central in understanding how new media operate and how they may affect children's everyday lives and learning is the notion of 'technical mediation' (Latour, 1994). While the concept of 'technical mediation' has often been used in a rather generic way, Bruno Latour (1994, pp. 32–29) identifies four distinct modes of 'technical mediation' in his analysis of the multiple interrelations between technical devices (so-called actants) and human 'actors':

- 'black-boxing', which renders invisible the role of technical devices
- 'translation' of a programme of action to another one
- 'composition', that is relating of things that were previously different or unrelated
- 'delegation' of action from a certain actor to another one (e.g. from a developer team to software)

According to Latour, all these modes of technical mediation work through human actors and technical devices symmetrically, that is without that human actors always have the central role, as other paradigms would presume. Latour argues that technical mediation shapes, transforms and diffuses action, so that understanding who or what is acting is not always straightforward.

The work by Bruno Latour did not refer originally to interactive, fast and mobile audio-visual media designs—nor did it refer to children's and young people's learning and corporeality. We propose that this analytical concept can be useful when trying to understand how children's bodies, media and digital

technologies and other devices relate to each other as to produce the blurred, contemporary, 'onlife' worlds, which children and young people inhabit. In this frame, we will employ below Latour's concept of 'technical mediation' in order to analyse two empirical examples from our recent research projects. The first example explores various forms of technical mediation between a two-year-old girl and a music-making App in a home setting. The second example highlights the interrelations between a five-year-old boy and virtual reality technologies in a Makerspace workshop associated with the FabLab Berlin. The analysis of the two empirical examples leads into a broader discussion about learning and education in the contemporary 'onlife' worlds.

2 Emilia with a Music-Making App

During one of our recent European projects, Kristiina, the second author, studied a home setting in a suburban metropolitan area in southern Finland, with a Finnish-speaking family consisting of a mother, father and one two-year-old child Emilia.[1] The child's name has of course been replaced with a pseudonym to ensure anonymity. The empirical data collection followed the principles of the 'day-in-the-life' methodology developed by Julia Gillen and her team (Gillen et al., 2007; Gillen & Cameron, 2010), and combined interviews with parents, photography, video recordings and field notes of children's digital literacy practices at home (Kumpulainen et al., 2020).

Emilia was sitting on a sofa using a music-making App that she had independently located online, while she was glancing through the different applications, which her parents had allowed her to search on a tablet. In this App, different pictures make different sounds. At first, Emilia was just going through the pictures, tapping them one by one and listening to different sounds. The sounds made her laugh, and she became interested in tapping different sounds. Her father then joined in to see what she was doing, and for a while, they together explored the functions of the App and how it worked. In doing so, Emilia and the father engaged, to some extent, in unpacking the 'black box' of the invisible ways in which the technology worked. They explored the various options of the App interface; however, they could not intervene in the design of the App or the mechanics of the tablet, which remained 'black-boxed' in Bruno Latour's (1994) terms.

[1] We refer here to the 'Digital Literacy and Multimodal Practices of Young Children' COST Action (Nr. IS1410) led by Prof. Jackie Marsh (University of Sheffield).

Eventually the dad left Emilia and she continued to produce sounds with the App on her own. Emilia's engagement was in this case mediated by the App, that is followed programmes of actions and rules, which the App developers created as well as rules, which her parents have set for her usage of the tablet and technology, in general. These rules—that is her parents giving her a certain amount of freedom in using the tablet—allowed her to explore different applications and resulted in Emilia locating and using a music-making App that attracted her attention. Neither the App developers nor the parents needed to be constantly present for Emilia to follow the rules, as the initial programme of action set by developers was 'delegated' to other actors, that is parents, Emilia and the device itself and then to the device and Emilia alone.

Soon Emilia became distracted, and she changed places from the sofa to the floor. After this, her mother joined her to see what she was doing. Emilia started to play the sounds to her mother, and together, they got seemingly excited about tapping the pictures and creating the sounds, and they shook their bodies to the rhythm of the sounds that they had created. Here, both Emilia's and mother's online/onscreen activity became blurred with their offline/offscreen body movements. This could be the beginning of a 'composition' in Latour's terms, that is of a specific combination of previously unrelated App sounds and Emilia's and her mother's body movements. These findings also evidence, in Latour's terms, how a programme of action, that is music-making with the App, that is onscreen, was 'translated' into another programme of action, in which Emilia and her mother were no longer making music on the tablet but moving and dancing to the sounds, which the App was playing back in the 'onlife' space emerging out of the 'composition' of the sitting room (offline/offscreen) and the App interface (online/onscreen). If repeated, this composition could eventually turn in the future into a trivial family dance or become part of some wider ritualised family activity, such as dancing in front of guests, dancing as a way to begin the day in the morning and so on (Wulf et al., 2001).

3 Jörg in Engagement with Virtual Reality and Immersive Technologies

During another recent European research project,[2] Michalis, the first author, followed ethnographically Jörg (pseudonym), a five-year-old boy, who participated in a virtual reality workshop, one form of Makerspace associated with the FabLab Berlin (cf. Kontopodis & Kumpulainen, 2020). A fab lab, that is

[2] We refer here to the project *Makerspaces in the Early Years: Enhancing Digital Literacy and Creativity* (MakEY) led by Prof. Jackie Marsh (University of Sheffield, Marie Skłodowska-Curie Grant Nr 734720).

fabrication laboratory, is an open digital fabrication studio where one can learn how to use 3D printers, laser cutters, computer numerical control (CNC) routers, design software and electronics. The FabLab Berlin consisted of so-called Makerspaces, that is collaborative work spaces for making, learning, exploring and knowledge sharing with the available tools and technologies. It also offered access to a professional Do-It-Yourself studio and was not only open to children and young people but also to adults and, in some cases, to professional entrepreneurs.

In one of FabLab's collaborative working spaces, a female facilitator, who was about 30 years old, asked Jörg to create with cardboard and a variety of other tools such as scissors, paint, pencils that were provided a world for a wooden doll, which she had brought to the FabLab. After Jörg created the world of the doll with cardboard and painted it, he was asked to also create a similar environment for the doll by means of virtual reality tools. Other children were present, including Jörg's older brother, who was producing his own version of the virtual environment for the same doll. Jörg could see the doll (offscreen) on a desk alongside the painting materials as well as the doll's virtual replication on a 2D laptop screen. For 3D vision he was required to wear the HTC VIVE headset, which was connected through cables to two controllers, one for each hand as well as a set of sensors and a data processing unit. When he did that, he could no longer see anything offscreen.

While Jörg tried the HTC VIVE headset, he stepped on the (offline/offscreen) cable connecting it to the processing unit and almost fell on the floor. The facilitator quickly supported him so that he didn't fall and moved the cable further away, so that Jörg could focus on the virtual environment as it appeared through the HTC VIVE headset. Then the facilitator invited Jörg to use the mouse, select a virtual brush and move it in a certain direction so as to further paint, modify and design the doll's virtual environment. The facilitator explained to Jörg that he could move his whole body and even walk around, if needed, during the painting, but within the provided virtual room space, which was marked by virtual walls. Two minutes later, Jörg was crossing the virtual wall, which meant that he also moved out of the offline/offscreen marked workshop area; without realising it, he slightly touched a (real) chair with his back, which he couldn't have seen as he was wearing the HTC VIVE headset. This was unexpected for him and created some confusion; the facilitator intervened again, Jörg removed the headset, with everybody—him and the other boys—bursting into laughter.

How virtual reality and immersive technologies work is not of importance to the average modern-day user, it is usually 'black-boxed', as also had been the case in the previous example with Emilia. Little is known on how the

processing unit processes the recorded data, the coding behind the rather user-friendly painting interface or the multiple connections between all different parts (cables, sensors, controllers, PC and VR headset). When Jörg stepped literally *on* the cable and metaphorically *out of* the virtual reality environment some of this 'black-boxing' was reversed—but not for long (Latour, 1994). If Jörg, as it often happens in FabLabs, would engage for a longer period of time in the coding of the software and/or in the production and design of the hardware, this black-boxing could be entirely reversed and re-programming could take place.

The 'composition' of software + PC + virtual reality headset + cables + sensors + controllers + chairs did not just do *more* or *better* of what Jörg would anyway do, it did *different* things: Jörg spent a while walking around and moving his hands offline/offscreen, an action which was 'translated' through the sensors into online/onscreen brushing, painting, deleting and finally into designing a virtual 3D environment for the doll in ways that neither Jörg *nor* the software programme (and its developers) would have necessarily envisaged in advance. The environment initially designed for the doll on cardboard with standard (offline/offscreen) painting tools was then 'translated' into something quite different: a 3D space on screen, mediated through software as well as through a series of offscreen cables, sensors, controllers and other devices. Jörg could after a certain point leave the space and 'delegate' (in Latour's sense) his programme of action to the software, which would continue providing the 3D-designed/immersive environment for the doll in Jörg's absence.

4 Outlook: Learning, Teaching and Schooling in Contemporary 'Onlife' Worlds

As the two cases in these brief extracts evidence, children's bodies and everyday lives are nowadays becoming more and more intertwined with technical devices. Different modes of technical mediation ('translation' of a programme of action to another one; 'composition'; 'black-boxing' and 'delegation' of action from humans to software and vice-versa) are continuously at work, so that the boundaries between life 'online' and life 'offline' are becoming increasingly blurred. Contemporary children's and young people 'onlives' unfold within complex on-/offline/ on-/offscreen, technically mediated environments. Ever more frequently, children and young people move across multiple technical interfaces, devices and designs—sometimes they even create new ones—as to share with others their knowledge, feelings, dreams, phantasies and concerns. As opposed to listening to commercial music or to watching

mass TV programmes, they thereby often become 'digital makers', that is to say co-productive and transformative in co-creating, locating, filtering, editing and re-using media contents. They sometimes even (re-) programme soft- and hardware and create new platforms and interfaces (Kajamaa & Kumpulainen, 2019; Kontopodis et al., 2019).

When considering the relevant research findings and the two aforementioned examples from our studies of children's everyday lives and learning, it becomes evident that formal education can no longer remain a secluded space. The technical devices and communicative resources that teachers and students use inside and outside the classroom mediate the communication and learning between teachers and students in quite different ways than classic school curricula, textbooks and notebooks did. Images have always, of course, played an important role in education as they can shape and transfer human imagination to other places and times (Wulf, 2022). The new element in contemporary *Bildung*, that is enculturation and formation through images (in German: *Bilder*), is speed and multimodality, as Arnd-Michael Nohl and Morvarid Götz-Dehnavi (this volume) also argue. Images with multi-sensory effects, often in 3D formats, are technically mediated, edited and circulated in speedy ways, thereby capturing children's and young people's attention, imagination and learning. To respond to and build on the technical mediation of children's everyday lives, it is important that contemporary schooling and its teaching and learning practices will similarly transcend online and offline spaces and, when relevant and possible, enable multiple connections between various types of media and literacies, as well as between different (on-)life spheres and diverse cultural and socio-economic milieus.

Even if children and young people are often offered more possibilities to engage creatively with technology today than with the commercial music or TV programmes in the past, technical mediation is not as neutral as digital industry suggests that it may be: it enables certain actions to happen and prevents others from happening. Much attention is given in the relevant literature to the various layers of knowledge-power relations incorporated in 'black-boxed' technology—be it racial, gendered, age-related, capitalist and/or geo-political (Banaji, 2015; Selwyn, 2013; Taylor & Hughes, 2016). Seen from such a perspective, there is a need to move away from learning existing ways of doing things with technology; rather, the emphasis can be placed on how children may experiment with the mediating technologies and the various 'onlife' environments, which children, researchers, programmers, facilitators and various non-human actors co-create and co-inhabit, so that plural, inclusive and sustainable virtual realities emerge (Hasse, 2015; Kontopodis, 2019).

It is clear that education today should recognise the different forms of technical mediation, as part of (trans-) literacies that create opportunities for children's and young people's communication and learning in and across their onlife worlds. This equally applies to assessing learning achievements that clearly can no longer rest on narrow and pre-defined assessments that by large rely on the notion of completeness and coherence in learning (Kumpulainen & Sefton-Green, 2014). Instead, here, we should cherish unpredictability and possibilities that arise both for teaching and for learning. Hopefully, in this way, formal education can support children and young people in their (learning) 'onlives' while further co-designing and even transforming the contemporary, messy and unstable, technically mediated environments, in which they find themselves entangled.

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