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Digital Good
NETWORK

Exploring Children's Attitudes Towards Digital Good/Bad

through hybrid arts practice

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Contents

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Section 1
Digital Good/ Digital Bad

Section 1: Digital Good/ Digital Bad

1.1 Literature Review Introduction

This report shares the findings of a project funded by the Economic and Social Research Council's (ESRC) Digital Good Network that sought to explore children's attitudes towards notions of digital good and conversely digital bad through hybrid arts practice.

The project built on our previous work that has centred on one or more emerging technologies, exploring what this might mean in terms of children's entertainment, play, education and/or health. To tie in with the wider Network's provocation about whether a digital good society is possible and if so what it would look like, we connected our ideas to a project we previously undertook called *Countermeasures* (Main & Yamada-Rice, 2022), which taught children about digital sensors, the data they can collect about them and used speculative design (Dunne & Raby, 2014) to create tools to subvert/block them. In that project we focused on four technologies: smart watches, phones, speakers and Nintendo Switch Game Consoles.

The Digital Good/Bad project, as we nicknamed, it was broader seeking 9-13-year-olds attitudes towards notions of digital good/bad and knowledge of how these may differ from adults. We believe that understanding children's ideas/ knowledge is crucial in shaping our collective vision and actions, towards how technologies and software are developed, taught and generally included in their lives.

As theorists we drew upon Kress (2010; 1996), Barad, (2007), Nail (2020) and practices relating to ethical implications of digital, and emerging technologies. As will be shown in later parts of this report this was achieved through networking events leading to the production of materials that were then used in hybrid art workshops with children to imagine and shape possible "digital good" futures, where technology use is ethical, responsible, and inclusive. The networking events, development of workshop materials, the methods we used to work with children, and the findings from these stages are discussed in later sections of this report. Before that, this section offers a literature review that covers the broad concept of digital good/digital bad with a focus on policy and education framework reviews, and then looks at children and Artificial Intelligence as the newest emerging technology to be integrated into their lives.

1.2 Policy & Education Framework Reviews

One of the key areas of policy work in recent years has been undertaken by Professor Sonia Livingstone and her team at the London School of Economics Department of Media and Communication. A report from 2019 entitled "Children's data and privacy online: growing up in the digital age" focuses on three distinct areas: personal privacy, institutional privacy and commercial privacy. For each of these areas, there is work to be undertaken from a research perspective to investigate children's digital behaviour. A key finding presented in this review is that children often do not have a clear or critical understanding of their rights in terms of data being harvested and used by commercial companies.

In addition, the authors believe that this must be addressed in terms of improving their own digital literacy skills and, in many cases, that of their parents and guardians.

Another policy framework published by the UK Council for Internet Security in 2020 entitled '*Education for a Connected World'* attempts to address the three key areas of concern described by Livingstone et al (2019) by presenting a framework specifically aimed at helping schoolchildren and young people to develop a critical understanding and skillset for leading an ethical and fulfilling digital life. This report focuses on the following eight areas:

1. Self-image and Identity
2. Online relationships
3. Online reputation
4. Online bullying
5. Managing online information
6. Health, wellbeing and lifestyle
7. Privacy and security
8. Copyright and ownership

(UK Council for Internet Safety, 2020, p. 2)

The framework covers schoolchildren in the following age groups: 4-7-year-olds, 7-11-year-olds, 11-14-year-olds and 14-18-year-olds and provides learning outcomes that schools should be aiming for in these eight areas in relation to those age groups. For example, in the self-image and identity strand, the framework encourages young people to think about the differences between a person's "online self" and "offline self" in order to develop the young person's self-awareness around the concept of identity and to help young people become critically aware of the promotion of acceptable personality stereotypes by social media platforms. This strand also aims to help young people develop a critical understanding of the impact of digital media on people's self-image and behaviour.

In the process of completing this strand, the framework states the critical knowledge and understanding that the young people should have obtained. These outcomes are tailored to the specific age groups as the following example in Table 1 illustrate:

4-7 yrs	7-11 yrs	11-14 yrs	14-18 yrs
I can explain how online content can limit our autonomy by influencing peoples' thinking, feelings, beliefs, behaviours and responses; I can recognise and evaluate different factors and their impact.	I can demonstrate ways someone can use the internet and social media for positive self-promotion including enhancing employment prospects.	I can describe and critically assess ways in which viewing online sexual content can influence expectations and behaviour in relationships; I can assess how unrealistic or unreciprocated expectations could damage a relationship or be abusive.	I can describe and assess the creative benefits and ethical drawbacks of digital manipulation. I can explain and assess the importance of purpose and context in evaluating digitally edited personal images

Table 1: (Taken from the UK Council for Internet Security entitled *Education for a Connected World,* 2020, p. 9)

This format is repeated for all the remaining seven themes of the framework. The framework also includes an informative glossary of terms in an appendix at the end, along with links and information about other resources and organisations that schools can contact (e.g. Education Scotland). One aspect which may have been a good edition to this framework proposal would have been to include a worked lesson plan on how teachers have adapted one of the eight strands into a lesson or series of lessons for a group of pupils (e.g. include a lesson a plan and a video recording of the delivery of the session). It would also have been useful to have seen how teachers could have evaluated the proposed learning outcomes.

In 2022, OFCOM published a report entitled '*Children and Parents: media use and attitudes'.* The particular focus of this report was on young people aged 3-17 and their experiences of using digital media with the intended audience of the report being aimed at commercial companies, academic researchers, policy makers and parents.

One of their key positive findings was that 8 out of 10 children in this age range went online to seek support for their wellbeing (e.g. accessing online videos to help with sleep problems and to relax). In terms of negative experiences nearly all the children surveyed said that they were more likely to get bullied online rather than in face-to-face settings. In fact, 84% of those who took part in the survey said that they had experienced some form of online bullying in the form of messaging, video calls, when playing games online. They also noted that parents paid less attention and intervened less in their children's online behaviour as they got older, although many also expressed a lack of digital literacy themselves in terms of a critical understanding of the knowledge and skills required when interacting with some digital media platforms. Overall, their report highlights where there are areas of skill and knowledge development needed for adults and young people in the UK.

One of the initial desires for this project was to explore children's knowledge and ideas about Artificial Intelligence. As a team we have been involved in a range of projects that have explored children's knowledge of and use of technologies as they emerge, and AI is the newest technology emerging in children's lives. The next section explores what literature already exists in relation to children and AI.

1.3 Children & Artificial Intelligence

This entirety of this section will be appearing in a different form in a forthcoming publication (Dare & Yamada-Rice (in press)).

It is our belief that children, like adults, should be able to access a range of understandings of Artificial Intelligence (AI) and wider digital technologies, including the understanding that AI is the manifestation of ideas which might be more critically framed as ideologies. AI is not a scientific set of 'facts' but a largely unmet range of speculative projections currently supported by specific statistical and mathematical processes which have formal mathematical limits as well as capabilities.

These processes range from machine learning to expert systems and calculus (differentiating here between statistical operations upon data and meta mathematical optimisation processes for evaluating the accuracy of training, such as gradient descent). The construct of AI and digital technology as not neutral but ideologically entangled is supported by numerous theorists such as Pasquinelli (2023) in 'The Eye of the Master' who states: 'the organisation of labour in a given epoch influences the formation of technologies and instruments, and thereafter of scientific paradigms, conceptions of nature, and models of the mind too' (p.154). The ideological nature of digital technology might constructively inform children's understanding of AI and wider technological trajectories.

Writers such as Adam (1998) and Benjamin (2019) provide further analysis of the way the AI imaginary, particularly as embedded in robots, is so often manifest in the form of female servants, more like maids or slaves then equals or mere 'tools'. In 'Race After Technology', Benjamin (2019) writes: 'the intertwining history of machines and slaves, in short, is not simply the stuff of fluff magazine articles' (p.23). The conflation of servitude with artificial intelligence is reflected in earlier writings about AI, such as Leonard (1997), who wrote of intelligent agents that their:

> …enthusiasts think it's neat to have digitally indentured servants. MIT's Nicholas Negroponte wants his digital butler badly. But what kind of illusions are we perpetuating when we dream of marshalling armies of bot soldiers to do our bidding?'
>
> (Leonard, 1997, p.84).

Adam (1998) also critiques the narrowness of how AI is conceived: 'AI's focus on individual knowing, on intelligent agents whose minds operate by reasoning with symbolic representations, tends to deflect the possibility that cultural concerns might affect their ways of knowing and operating in the world' (p.64).

Who gets to define the way AI or machine learning impacts what is considered useful knowledge? What do children think about the way what is valued as knowledge might unfold for themselves or their friends and families as well as wider society? Adam (ibid) writes: 'Rationalist philosophy has sidelined the body in giving the mind the primary role in the making of knowledge and rationality' (p. 129). Do children see their own bodies as epistemically insignificant; do they think other animals and living entities lack intelligence?

Children's ideas are rarely, if ever taken into consideration by those who develop the specific algorithms as well as the wider infrastructures required for digital systems to operate.

Surrounding the specific processes needed for machine learning to unfold there are also communication networks, investors, venture capitalists, corporate hopes, marketing hype, chip manufacturers, server farms, energy suppliers, water cooling systems, call centres, pre-processors, moderators, politicians, salespeople, con-artists, scientists, sociologists, journalists, engineers, mathematicians and governments. Any list will be incomplete as companies and schools, government departments and almost all organisations are encouraged to believe AI or 'digital' has the answer.

Despite the increasing realisation that Generative AI, in particular, has no convincing use cases (see alarmed reports from the financial press) countless adverts still bombard us on LinkedIn, X, The Financial Times, Forbes etc. Yet, recent headlines also suggest an end to this current hype cycle as 'US markets suffer worst day since 2022 as Tesla and AI stocks fall' (Steer & Huges, 2024, n.p.). The environmental costs and huge amounts of money invested in Generative AI appear to reap very few of their promised rewards. Do children have access to this information, if so, how? What are their sources for understanding AI and wider digital technologies? According to Su and Yang (2022) 'there is a scarcity of research on AI education for young children who have no prior knowledge of computer programming and robotics' (n.p.).

The environmental costs of Generative AI might easily outweigh any putative benefits, especially when private nuclear reactors are involved. Reports in 2023 suggested Microsoft as well as OpenAI were searching for solutions to their need for exponential supplies of power to fuel their server farms. 'Artificial intelligence takes a lot of compute power' wrote Clifford (2023), adding: 'Microsoft is putting together a road map for powering that computation with small nuclear reactors' (ibid, n.p.). Cloud anthropologist Steven Gozalez Monserrate (2022) writes in detail about the materiality and environmental cost of the Cloud, which is only nominatively 'immaterial':

> To get at the matter of the Cloud we must unravel the coils of coaxial cables, fibre optic tubes, cellular towers, air conditioners, power distribution units, transformers, water pipes, computer servers, and more. We must attend to its material flows of electricity, water, air, heat, metals, minerals, and rare earth elements that undergird our digital lives. In this way, the Cloud is not only material but is also an ecological force.
>
> As it continues to expand, its environmental impact increases, even as the engineers, technicians, and executives behind its infrastructures strive to balance profitability with sustainability.
>
> In my experience, nowhere is this dilemma more visible than in the walls of the infrastructures where the content of the Cloud lives: the factory-libraries where data is stored and computational power is pooled to keep our cloud applications afloat.
>
> (Monserrate, 2022, n.p.)

Despite these burgeoning environmental and financial costs there is still pressure to apply data driven technologies, including in schools, fuelled perhaps by a fear of missing out or appearing old fashioned. Teachers have come under intense pressure to “integrate” these largely untested, energy hungry tools into their teaching, while multiple industries have undergone premature labour corrections due to the expectation that AI will soon diminish the need for workers. To date, the burgeoning demand for power and water to support data centers across the U.S. and globally has occasionally made headline news, but the impacts on the environment are usually overshadowed by the tech industry’s need for more power, both literally and figuratively’ (University of Virginia, 2024).

For Benjamin (2019) the construct of smartness itself ‘hearkens back to the eugenic underpinnings of both artificial and organic intelligence and its primary directive to categorize and rank humans, eradicating those deemed worthless while propagating those judged worthy’ (White, 2022, n.p.). Perhaps AI education should also support children to understand the relationships between colonial extraction, eugenics and the trajectory of AI, in the context of an era in which AI CEOs are increasingly unashamed of their racist politics (see Palantir CEO, Peter Thiel’s financing of Trump's Running mate J.D. Vance and Musk’s donations to the Trump campaign in July 2024).

In 2023, Elon Musk caused a stir when he told the right-wing provocateur Tucker Carlson ‘that he plans to build “TruthGPT,” a competitor to OpenAI’s ChatGPT. Musk says the incredibly popular bot displays “woke” bias and that his version will be a “maximum truth-seeking AI”-suggesting only his own political views reflect reality’ (Knight, 2023, n.p.).

The construct of AI as a black box has arguably been unhelpful, adding to the mystique of systems which have quite an obvious corporate logic underpinning them: to extract profit and maintain power. Yet ‘thinking with technology remains difficult for many adults in the workforce, so much so that any device or software becomes a “black box” to the user. It is no wonder, then, that algorithms and the literacies that would help make sense of them feel impenetrable to those who might still be gaining fluency in basic digital skills’ (Ciccone in Ito et al, 2023, p.16).

Yet, even when the conditions for understanding data driven systems and machine learning arise (such as in Computing Departments or coding classes) there can still be an absence of structural thinking, such that the non-neutral history of statistics and technology is negated. Clayton (2020) unequivocally outlines the eugenic history of statistics, stating:

> It would be convenient if statistics existed outside of history, but that’s not the case. Statistics, as a lens through which scientists investigate real-world questions, has always been smudged by the fingerprints of the people holding the lens. Statistical thinking and eugenicist thinking are, in fact, deeply intertwined, and many of the theoretical problems with methods like significance testing-first developed to identify racial differences-are remnants of their original purpose, to support eugenics.
>
> (Clayton, 2020, n.p.)

The statistics Clayton (2020) identifies as having been developed to prop up eugenic white supremacy are part of the core operations of supervised machine learning, such as Galton's Regression toward the mean. Salvaggio (2024) argues that the mainstream corporate framing of AI has added to the problem of understanding it. What computer scientists might frame as mechanistic interpretability, meaning the act of reverse-engineering 'computational mechanisms and representations learned by neural networks into human-understandable algorithms and concepts to provide a granular, causal understanding' (Bereska & Gavves, 2024) is just the beginning of what we need to understand about digital technologies. Salvaggio (2024) has written:

> The way we have framed artificial intelligence since the generative AI boom has been deeply flawed. Rather than understanding AI as an automated form of data analytics, stripped of human supervision, we have seen countless reports on their capacities and outcomes. Pivoting our understanding of data collection and algorithms to the frame of "Generative AI" has unnecessarily severed the understanding of this technology, erasing a decade or more of scholarship into algorithmic systems and Big Data.
>
> This pivot has created a harmful frame shift as policymakers scramble to understand this supposedly "unprecedented" technology. The reason for this error is clear: it has direct benefits to industry leaders.
>
> (Salvaggio, 2024, n.p)

Children arguably cannot evaluate digital 'good' or 'digital' bad (and the continuum of practices in between) without having a foundation of understanding about these myriad and complex factors, in addition to and beyond the specific unfolding of algorithms. Technology does not exist in a bubble outside of climate and social justice urgencies. It cannot meaningfully be taught without making connections which situate technology in its social-historical and political contexts. It is well known that LAION 5-B, the enormous image dataset believed to have trained Midjourney and many other Stable Diffusion Generative AI systems, contains at least 2000 images of child sexual abuse (see David, 2023), yet none of the companies which profit from these images have taken credible action, let alone stopped using them.

In this context it is clear that corporations cannot be entrusted with helping children to grasp the meaning and impact of digital good or digital bad. It remains for parental figures, educators, activists and children themselves to see through the hype and instead trust in their own core values and intelligences when confronted with corporate, neoliberal truth claims about the capacities and trajectories of digital technology.

1.4 Literature Review Conclusions

In conclusion, we have found that there has been a number of reviews and frameworks put forward in the last 4-5 years with recommendations for parents, school children, policy makers and industry in relation to how to inform and educate children about digital technologies and related structures and their potential impacts on their lives. Yet, despite this it is hard to actually gauge the impact of any of it due to a lack of experiential evidence to evaluate the impact.

Much of the literature we have focused on in relation to AI looks into the deep ethical concerns we have with the technology. We have found nothing yet published that addresses this directly with children or seeks their opinions. As a result, some of the findings we share later in this report can be considered a starting point for a body of work in this area. A continuation of this research is needed to ensure ethical development and application of all emerging technologies in relation to children's lives.

Our project begins to fill a gap and could be viewed as a springboard for a more substantial, long term piece of work that could look at ethics of AI design, through further development of methodologies where children and young people are our research collaborators and not necessarily our co-creators, or participants. We believe there is a specific role that the social sciences and arts and humanities researchers can work together to address.

Section 2
Knowledge Exchange

Section 2: Knowledge Exchange

2.1 Knowledge Exchange Introduction

Our Digital Good/Bad project began with two public facing Knowledge Exchange (KE) events (Figure 1). At these ourselves and a series of national and international speakers were invited to share ideas within two general areas (1) current perspectives to do with emerging technology(ies), and issues concerned with creating a “socially good society”, and to consider (2) how we can gain children’s perspectives and educate them (formally or informally) about aspects connected to emerging technologies beyond simply how to use them.

The intention for having the public facing networking events was to draw out some key themes from beyond the project’s core team, to understand what wider experts in the field are currently exploring, and then use these themes as the basis for the research workshops we would go onto develop to gather children’s opinions and ideas. The remainder of this section is structured to highlight the themes that arose from the networking sessions. This then leads to Section 3 of the report that shows how these were used in the design and development of materials to be used in the research workshops with children.

Figure 1: Invitations for the KE Events

2.2 Public Knowledge Exchange Events

The talks and discussions that took place during the KE events were recorded using the online conferencing system's inbuilt option for this. The transcripts produced by the same system were checked for accuracy against the recordings and then used to draw out emerging themes.

As a result, this section outlines these key topics which are (1) AI in Relation to Specific Technologies, (2) Who Decides Tech's History (and Why?), (3) Tech and the Climate Crisis, (4) Big Tech Objectives, (5) How Tech Works, (6) Would Children Design Tech Differently? and (7) Surveillance.

2.2.1 AI in Relation to Specific Tech

In terms of salient points arising from the first networking event, we were joined by Octavia Reeves from the Ada Lovelace Institute. She talked about the Institute's research in this area and the need to explore AI not as a sweeping generalisation, but in relation to specific technologies. For example, the Ada Lovelace Institute and The Alan Turing Institute (2023) study that she presented found people had both positive and negative views of AI depending on the technologies or situations in which it might be used (Figure 2).

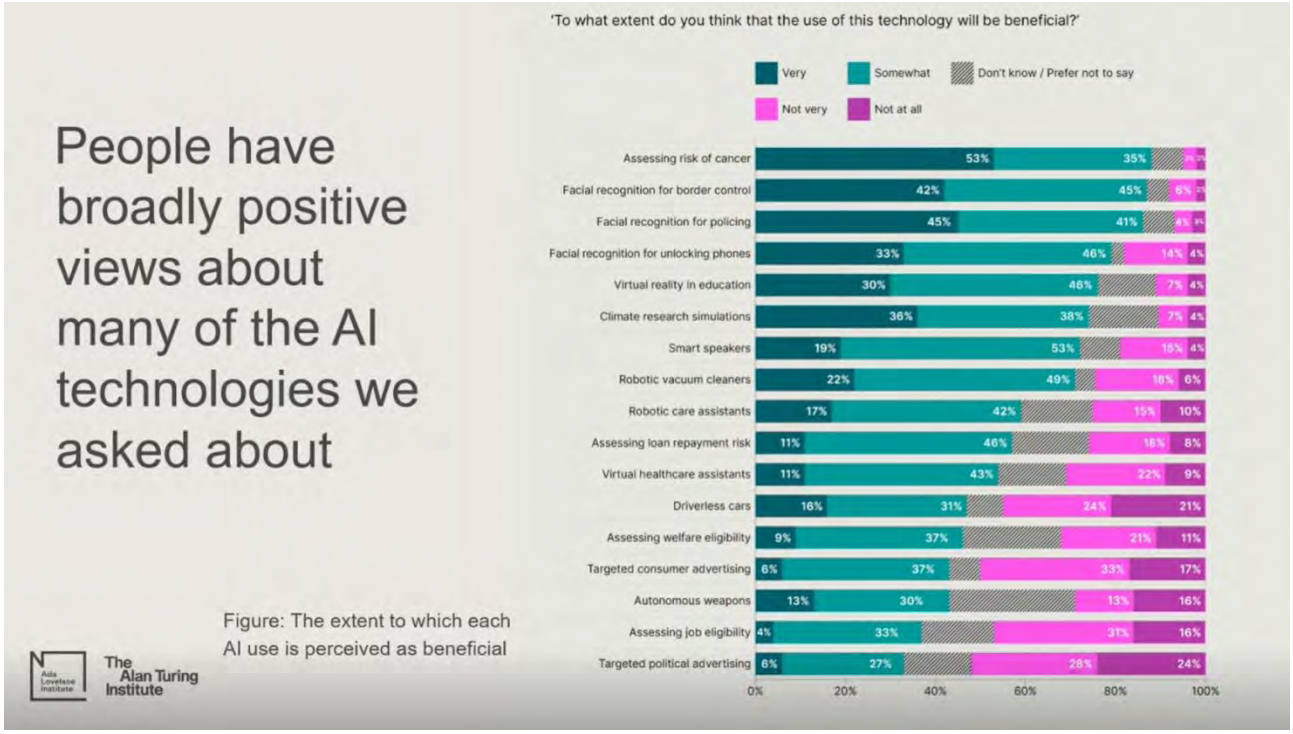


Figure 2: The extent to with each AI use is perceived as beneficial (Ada Lovelace Institute and The Alan Turing Institute, 2023)

In relation to Figure 2 Octavia Reeves stated:

> "*For example, the diagram shows that 88% of participants felt that the use of AI for predicting cancer risk was beneficial… so generally, some types of AI use were viewed as more beneficial than others."* (Reeves, 2023)

We would argue that these participants might not have been fully aware of the extent of some of the ethical issues highlighted in our literature review. Even so, it led us to think that we might also want to explore children's views of AI in relation to specific technologies. In addition to more general concerns around AI ethics. For example, if sick, would children prefer to see a human doctor? Or would they be OK with being diagnosed by AI?

2.2.2 Who Decides Tech History?

In his talk for one of the networking events, James Edward Marks from PlayLa.bz reminded us that science fiction and speculative design in this format can often lead to actuality and he drew on examples from films such as Kubrick's *2001 Space Odyssey* (1968), *Clockwork Orange* (1971), *The Wizard to Oz* (1939) and *Terminator* (1984).

Using this as a context Marks outlined the importance of continuing to reflect on the history of technology and how it affects its users. This allowed us to frame the following research questions:

- Do children see a connection between movies and technology?
- What role do children think the newest technologies will play in their lives?

This acted as a wider reminder of the need to think about technologies within the context of history and not to look at them as completely new, which can isolate them from their historical development through past media and related practices (e.g. Lankshear & Knobel, 1997). Instead, we should question what they are trying to replace in children's lives. Also, who is developing them and why? So other questions that we considered would be worth exploring with children in relation to this was:

- Do children know the histories behind technologies?

This fits quite well with ideas in Crary's (2014) book *24/7* which considers the development of dual-purpose technology, of which AI is one, that is designed to serve military and civilian needs:

> There are massive ongoing efforts by the scientific-military complex to develop forms of "augmented cognition" that will enhance many kinds of human-machine interaction. Simultaneously, the military is also funding many other areas of brain research, including the development of an anti-fear drug…As history has shown, war-related innovations are inevitably assimilated into a broader social sphere, and the sleepless soldier would be the forerunner of the sleepless worker or consumer.
>
> (Crary, 2014, p.3)

As a group we are highly concerned with the notion that there could be a situation in which technology that's developed for military use could also be considered a social good? Bearing in mind that previous work such as Playing the Archive (https://www.opiearchive.org/about/playing_the_archive) shows how children pick up on politics in their playground play, we wondered if there might be anything here, we can explore with children or is the topic simply too sensitive?

Examples of military technology presented as harmless or even ‘fun’ include the robotic ‘dog’ developed by Boston Dynamics, now owned by Google X, which is often depicted in dance poses or ‘funny/cute’ costumes which might appeal to children. These robotic dogs and artificial pack animals are often described as rescue machines, occluding their role as military and police surveillance instruments. Yet, the conflict in Gaza has seen technology corporations such as Microsoft and Google collaborating with the Israeli Defence Force, so that services which are seen as benign, such as Amazon Cloud services and Microsoft AI Tools are part of the surveillance of and military action in Gaza.

> Col. Racheli Dembinsky confirmed publicly for the first time that the Israeli army is using cloud storage and artificial intelligence services provided by civilian tech giants in its ongoing onslaught on the Gaza Strip. In Dembinsky’s lecture slides, the logos of Amazon Web Services (AWS), Google Cloud, and Microsoft Azure appeared twice.
>
> (Abraham, 2024, n.p.)

Understanding the long trajectory of AI as a military and surveillance mechanism is often suppressed in media reports and educational curricular, instead narratives which present machine learning as an unquestionably virtuous technology predominate, not least in the reporting of robotics.

2.2.3 Tech & the Climate Crisis

Another point James Edward Marks brought up was Big Tech’s connection to the climate crisis. A wide range of research has shown that children disproportionately suffer from climate anxiety compared to adults (e.g. Leffers, 2022; Sanson & Bellemo, 2021; Crandon et al, 2022).

James showed an image from Take the Jump (www.takethe jump.org) that had a series of practical guidelines for things we can do to help with the climate crisis (Figure 3):

Figure 3: Take the Jump

The provocation in Figure 3 to keep products for at least seven years raised the question of whether children would be content to use older technology.

In spaces of disadvantage where we are thinking that children are hampered by having older technologies, could there be a way within the context of the climate emergency for it to be reframed more positively because actually we all need to use technologies for longer? Crary (2014) describes the need to promote 'hybrid material cultures'. As a group of artists and musicians we can definitely see how older technologies can be repurposed for newer needs and we were keen to explore this with children too.

Provocations about the climate emergency also draw out the consideration of the connection between humans and other forms of life. In the context of AI is it correct to assume that we should be trying to replicate human intelligence? Does that mean we can ignore animal and plant intelligence?

2.2.4 Big Tech Objectives

At the first networking event Eleanor Dare suggested that we need to look at the motives that lie behind AI and who gains from them. Thus, it becomes important not to think of it as a kind of magical system (Main & Yamada-Rice, 2022), but to try to get children to unpack who owns tech companies, who is responsible for its development, and what are their motives? Even as adults these can be quite big questions but what about for children? Can they understand some of these issues as well? Are children interested in this?

These ideas link with those in Broussard's book *More than a Glitch* looking at biases involved in technologies:

> Up until the 1970s, dark skin looked muddy on film because Kodak…used pictures called "Shirley cards" to tune the film processing machine photo labs. The Shirley cards featured a light-skinned white woman surrounded with bright primary colours. Kodak didn't tune the photo lab equipment for people with darker skin, because its institutional racism ran so deep. The company began including a wider range of skin tones on Shirley cards in the 1970s. While this was the decade in which Black stars… raised to greater prominence, the change wasn't the result of activism or a corporate diversity push. Kodak made the change in response to its customers in the furniture industry [who]…complained that their walnut and mahogany furniture looked muddy in catalogue photographs.
>
> (Broussard, 2023, p.6)

The quote above about Kodak is shocking especially when we know that this is just one of many inbuilt prejudices that mean technologies help a few rather than all, and allows us to explore:

- How can we encourage children to question alternative design futures?

Connected to this, Angus Main outlined our earlier Countermeasures project, a finding of which was the need to educate children about how technology works (Main & Yamada-Rice, 2022). So, in that project child-participants drew around their smart watches, phones, speakers and Nintendo Switch game consoles and then added details of what they thought was inside. The project found children had a mismatch of ideas that combined accurate information with imagination and also bits of old technology such as wires (Figure 4).

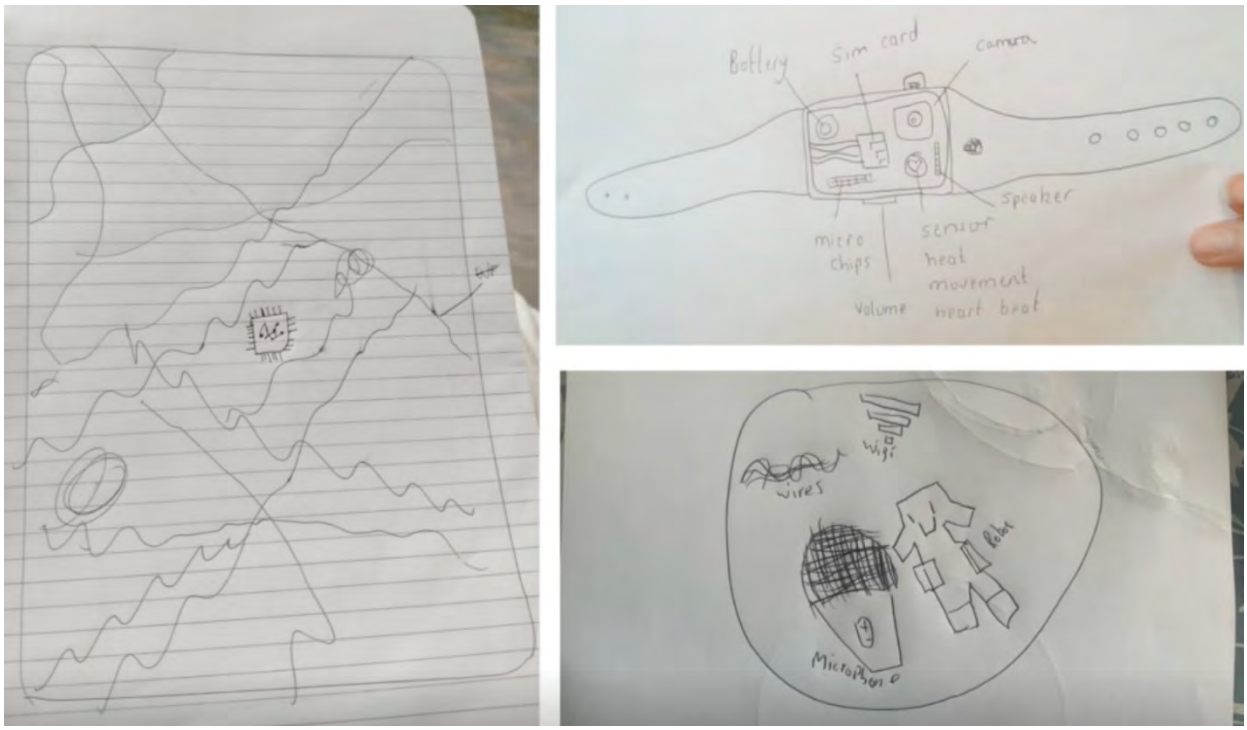


Figure 4: Images from the Countermeasures project showing children's ideas for what's inside their digital devices

This leads into another theme to emerge from the networking events which was about the need for children to know how tech works.

2.2.5 How Tech Works

Where are children's ideas drawn from? Why do they include outdated knowledge? Is it a deliberate ploy by tech companies? Main & Yamada-Rice (2022) mention how the tech company *Apple* deliberately uses the word magic as a ploy to make people think that technology is magical and thus beyond comprehension.

- How could children be educated to be critical of the terms used by tech companies?

This linked with a talk given by George Simms, a doctoral student at the University of Plymouth, who uses Crip and feminist theory to seek alternative ways of viewing technology. If after children have knowledge about emerging tech and what lies behind it, would they want to design technology differently?

- Could children design technology in a way that adults don't?
- Do children wish it could do different things and if so, how can we empower them to get there?

As a team we are situated within the arts and are interested in the development side rather than just focusing on children as consumers, i.e. how can we encourage creativity, making and critical thinking to allow children to believe that they could develop things differently, that they could make their own more local social networks for example and don't have to rely on Instagram?

2.2.6 Would Children Design Tech Differently?

As well as linking to ideas in the last section this also ties with ideas by Peter Frase (2016) in *Four Futures* that demonstrates how the future is not set in stone and that the past could have been radically different if we had opted to take free time over money in the age of automation. Thus, we wondered if providing children with opportunities to begin to make speculative designs for technologies could install in children the idea that they can define the future in a radically different way than what is currently in existence.

2.2.7 Surveillance

This brings us to the final theme, which came from Thomas Enemark Lundtofte's (University of Southern Denmark) talk. Based on research Thomas and his team were undertaking; he brought up the idea that there might be a gap between what children and adults want from technology. He gave an example of this in relation to surveillance apps where he stated that adults tend to put these apps on children's phones and are indeed even a motivation for giving them a phone in the first place, as a way to keep them safe, but actually children want phones to be sociable with friends. This served as a reminder that our research could consider the gaps between what adults want for children and what children want for themselves.

2.3 Knowledge Exchange Conclusions

In conclusion, several themes emerged from the knowledge exchange events that can be explored in relation to children:

- AI in relation to specific technologies and applications.
- Children's knowledge of who is driving technological developments, including AI and why.
- Awareness of the environmental impact of digital technologies and AI.
- Children's knowledge of technologies as surveillance mechanisms and their acceptance or concerns with this.

These themes along with those that arose from the literature review were taken forward into the development of materials that were later used in our research workshops with children. The development of these are discussed in the next section.

Section 3
Development of Workshop Materials

Section 3: Development of Workshop Materials for Children

3.1 Workshop Materials Introduction

The initial step in creating materials for the research workshops with children arose organically from the knowledge exchange events. The talks and discussions took place online and were recorded using the inbuilt option for this. The transcripts produced by the same system were checked for accuracy against the recordings. From this Dylan Yamada-Rice began using drawing as a way of thinking through key ideas that had emerged from the talks and discussions or as Suwa & Tversky's (1997) describe drawing was used as a means of having a conversation with herself. The drawings became a series of visual responses that were later shared in the second knowledge exchange event, expanded upon and then eventually became part of the research workshop materials in the form of a Zine that was produced by Richard Nash. More is discussed on the development of these two sets of materials in the following sections.

3.2 Development of Visual Prompts

The following subsections show how the visual prompts connect to the themes that arose from the knowledge exchange events as outlined in Section 2.

3.2.1 Visual Prompts: AI in Relation to Specific Tech

As was written about in the Section 2 research undertaken by the Ada Lovelace and Alan Turing Institutes and shared by Octavia Reeves suggested that we should consider exploring children's ideas of AI in relation to specific technologies and applications rather than just as a whole. This led us to ask:

- Do children have different views about AI in relation to specific technologies?

The following images (Figures 5-8) were created as visual prompts in relation to this:

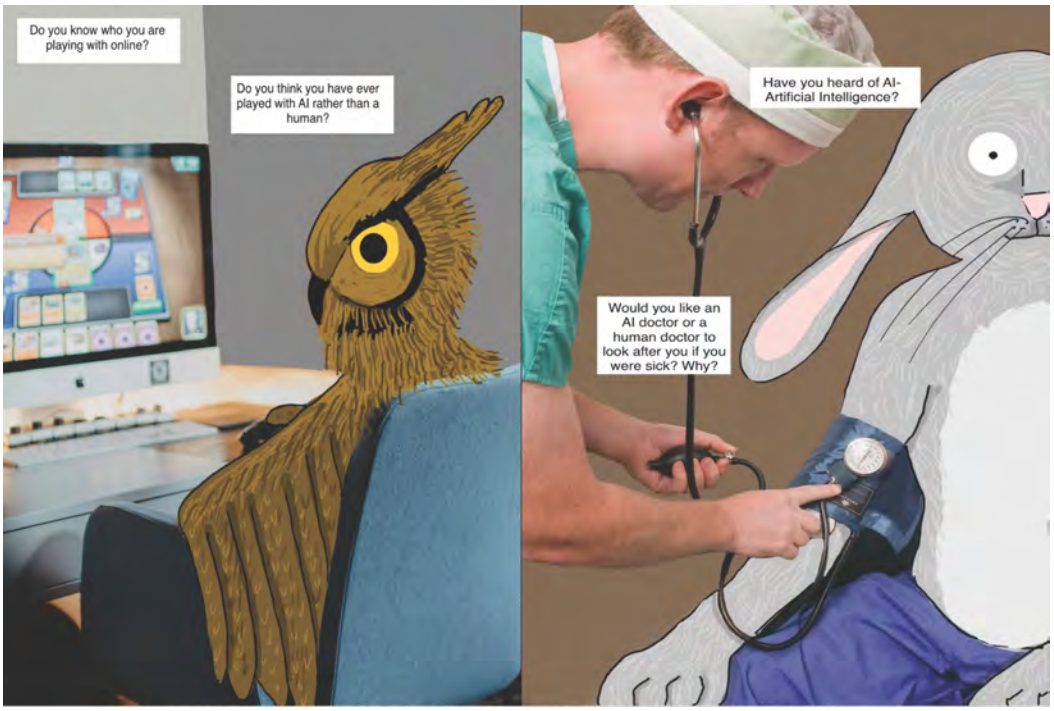


Figure 5 (left): Visual prompt about AI and gaming (Yamada-Rice, 2023)
Figure 6 (right): Visual prompt about AI and health care (Yamada-Rice, 2023)

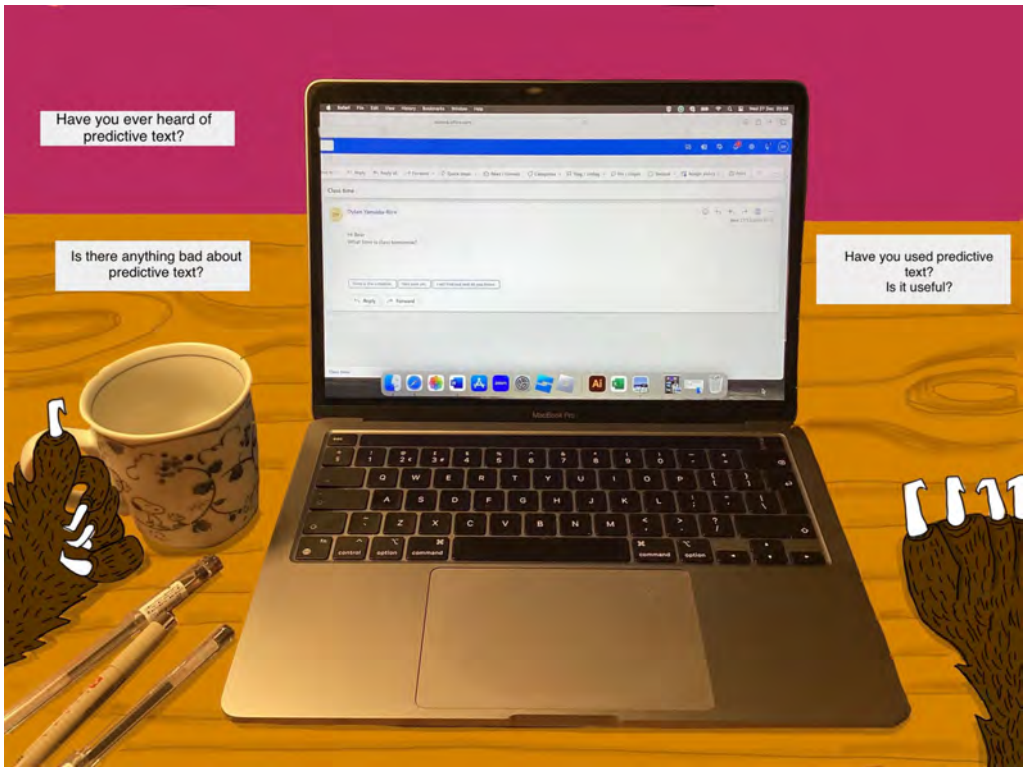


Figure 7: Visual prompt about AI and predictive text (Yamada-Rice, 2023)

Figure 8: Visual prompt about AI and assessment (Yamada-Rice, 2023)

In doing so, the drawings explored the contexts in which AI might be entering children's lives particularly in spaces they might be aware of, such as school life and gaming and thus making it more visible to them. This seemed a logical step of extending on the research undertaken by the Ada Lovelace and Alan Turing Institutions with adults that looked at AI's use for predicting cancer risk etc.

3.2.3 Visual Prompts: Tech & the Climate Crisis

Further visual prompts were made to explore the connection between AI and the natural world. Both in terms of environmental impact and also other forms of non-human intelligence.

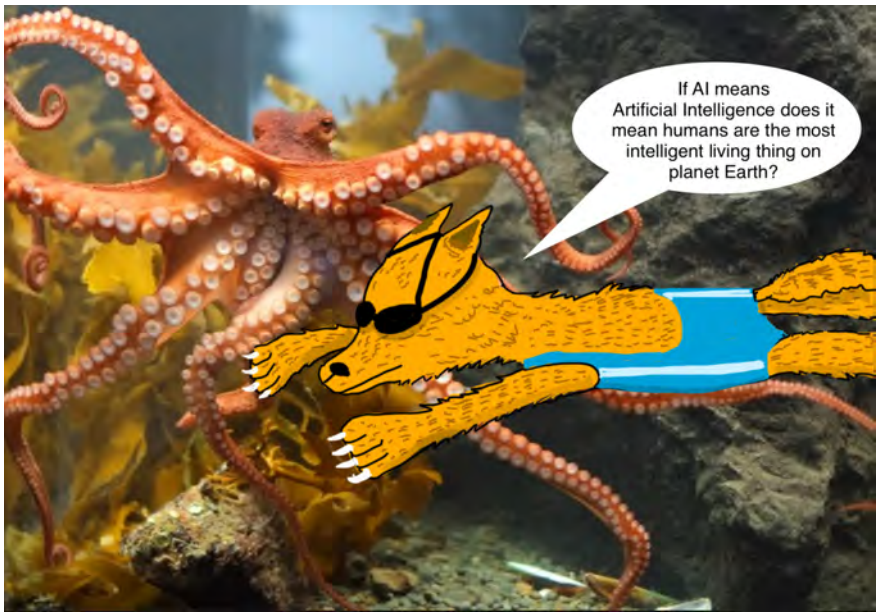


Figure 9: Visual prompt about AI and notions of intelligence (Yamada-Rice, 2023)

Figure 9 above was a response to the research team's interest in possibilities for alternative forms of AI development that do not replicate bias and stereotypes that have been made when creating datasets historically. Dare has been researching large image datasets as part of the *AI Forensics* project at the University of Cambridge and her research by practice uncovers the relationship between facial recognition and Galton's racist eugenics. Contemporary manifestations of these oppressive and pseudo-scientific processes are known as 'Carceral AI', meaning the use of algorithms to enact the mass imprisonment of people, particularly Black Americans, increasingly subject to predictive policing and racial profiling underpinned by machine learning. The image below (Figure 10) shows three of Dare's analogue drawings within the pages of a book consisting of 11,396 images of pizza that Dare mathematically derived from a pizza topping image dataset. Dare's series of artist's books combining synthetic images with hand drawn images seeks to invite questions about the way living entities see, experience and mediate the world as opposed to the disembodied Neoplatonism (abstraction) of machine learning systems.

Figure 10: Hand drawn images in an artist's book consisting of 11,396 synthetic pizzas (Dare, 2024)

Dare also seeks to identify different notions of intelligence, away from abstracted, binary systems of categorisation. One possible way forward is to consider pattern recognition and communication systems that exist within nature (see, for example, Kay et al, 2022). Figures 11 and 12 was drawn as a response to see if we could gain children's ideas in relation to this.

Figure 11: Visual prompt about technology and the natural world (Yamada-Rice, 2023)

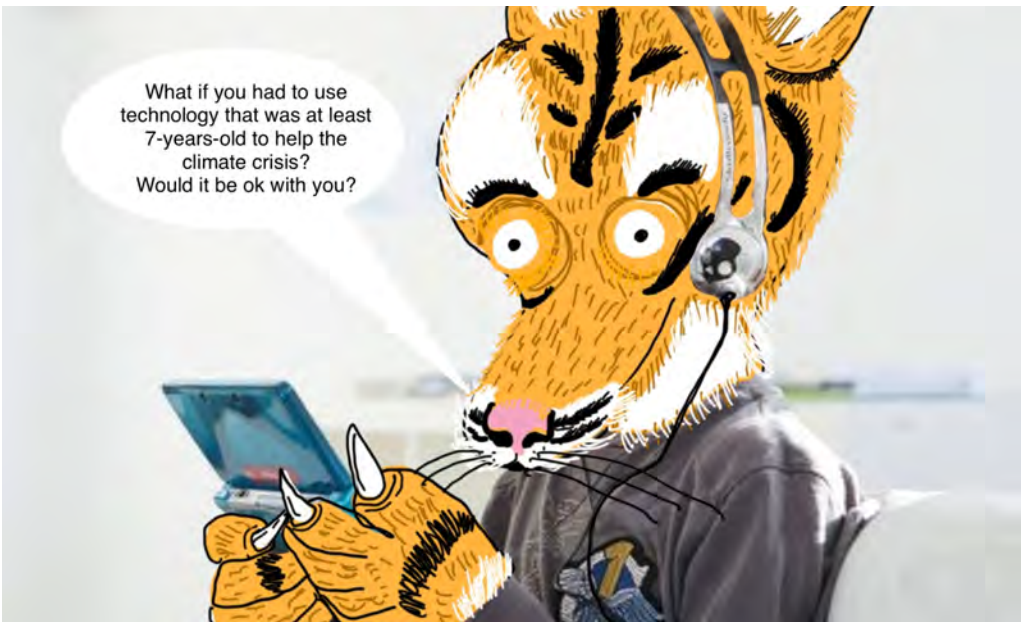


Figure 12: Visual prompt about sustainable use of technologies (Yamada-Rice, 2023)

Understanding of the specific natural materials used in AI processes is visualised well in Ivanova et al (2024) (Figure 13):

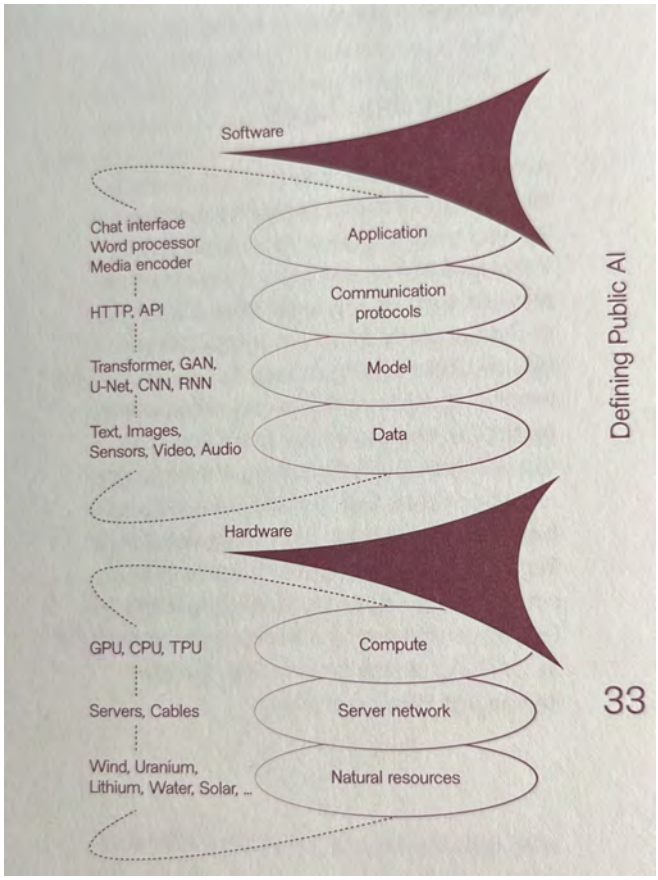


Figure 13: Resources needed to power AI
(Ivanova et al, 2024, p.33)

3.2.2 Visual Prompts: Design Fiction

One of the themes that arose from the networking events and literature review was to gauge children's ideas around who is driving technological development and why (Figure 14). Including specifics such as design decisions, i.e. Figure 15:

Figure 14: Visual prompt about Big Tech intentions (Yamada-Rice, 2023)

Figure 15: Visual prompt about design decisions in software (Yamada-Rice, 2023)

Given that we know that formal educational policies are in part driven by Big Tech objectives, we also wanted to explore children's views of media education (Figures 16-18).

Figure 16: Visual prompt about media education (Yamada-Rice, 2023)

Figure 17: Visual prompt about digital arts education (Yamada-Rice, 2023)

Figure 18: Visual prompt about the connection between art and media education (Yamada-Rice, 2023)

Figure 19: Visual prompt about physical computing education (Yamada-Rice, 2023)

3.2.4 Visual Prompts: Big Tech Objectives

James Edward Marks from Playla.bz got us thinking about the influence of Sci-fi on technology development pulling in references to films. Relatedly, in our own practice we often draw on notions of speculative design to imagine alternative futures. In *"Speculative Everything"* Dunne & Raby (2013) frame this practice within the paradigm of speculative design where artists and creatives imagine possible futures with technologies ahead of them becoming a reality. Whilst Dunne & Raby's work describe future facing practices, Marks reminded us that the history is equally as important. This led us to ask:

- Do children see a connection between movies and technology?
- What role do children think the newest technologies will play in their lives?

Prompts were made as a response (Figures 20 and 21):

Figure 20: Visual prompt to explore the connection between speculation and tech (Yamada-Rice, 2023)

Figure 21: Visual prompt about technology and schools (Yamada-Rice, 2023)

3.2.5 Visual Prompts: How Tech Works

Interest in children's knowledge of how technologies work arose from earlier work the group had undertaken in the form of an EPSRC grant called *Countermeasures* led by Angus Main. The *Countermeasures* project stemmed from Angus' wider work on digital sensors and the data they collect. Building on that work the visual prompts created below broke down some parts of how technologies and their related software work by using "What if" type scenarios:

Figure 22: Visual prompt about algorithms (Yamada-Rice, 2023)

Figure 23: Visual prompt about smart objects (Yamada-Rice, 2023)

Figure 24: Visual prompt about self-driving cars (Yamada-Rice, 2023)

3.2.6 Visual Prompts: Would Children Design Tech Differently?

In order to understand if children would design tech differently it is important to place their ideas in the context of how they currently use it.

Figure 25: Visual prompt about technologies and socialising (Yamada-Rice, 2023)

Figure 26: Visual prompt about gaming and digital good/bad (Yamada-Rice, 2023)

- Do children have their own ideas for how specific technologies should be designed?

Figure 27: Visual prompt to encourage the redesign of smartphones (Yamada-Rice, 2023)
Figure 28: Visual prompt to encourage the redesign of apps (Yamada-Rice, 2023)

Figure 29: Visual prompt to encourage the design of smart objects (Yamada-Rice, 2023)

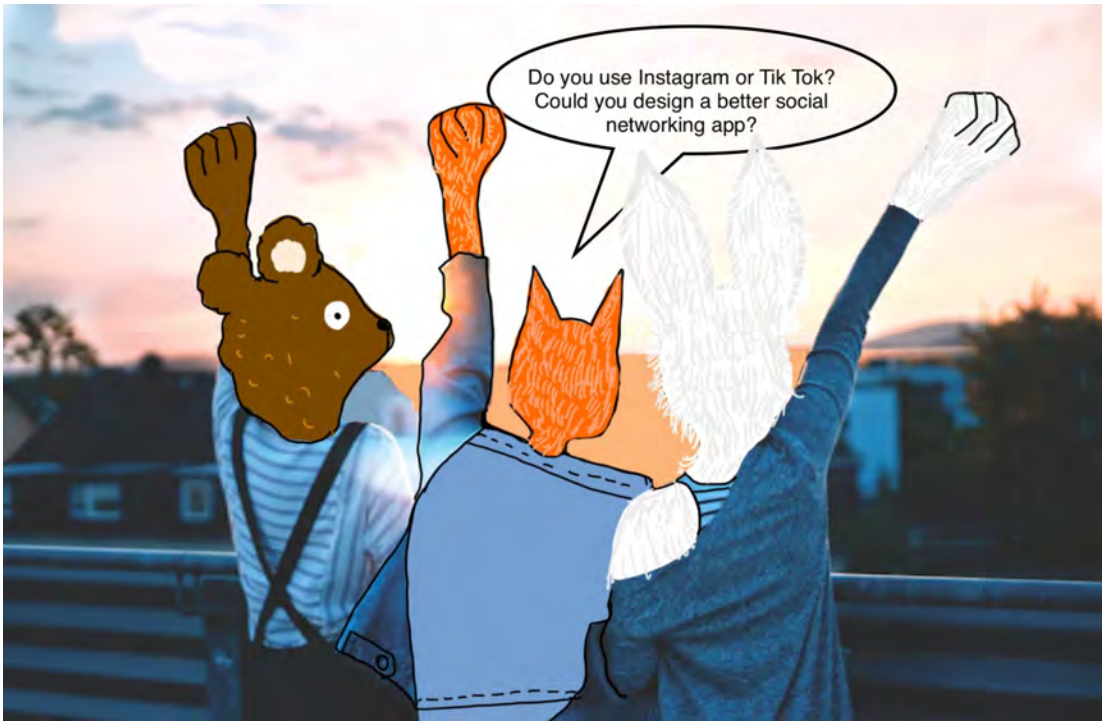


Figure 30: Visual prompt to encourage the redesign of social media (Yamada-Rice, 2023)

Figure 31: Visual prompt to encourage the redesign of games (Yamada-Rice, 2023)

George Simm's shared his doctoral research on configurable methods and asked the audience to consider who is designing AI, technology and interfaces and how they can be made more inclusive. In making the point he drew on Lucy Suhman:

> Configuration in this sense is a device for studying technologies with particular attention to the imaginaries and materialistic that they join together, an orientation that resonates as well with the term's common usage to refer to the conjoining of diverse elements in practices of system design and engineering.
>
> (Lucy Suhman, 2012, p.48)

3.2.7 Visual Prompts: Surveillance

Visual prompts (Figures 32-35) about surveillance were made in response to Thomas Enemark Lundtofte's KE talk about how his team's work is considering differences between why adults give children smart phones (i.e. to track them) and why children want them.

Figure 32: Visual prompt about tracking apps (Yamada-Rice, 2023)

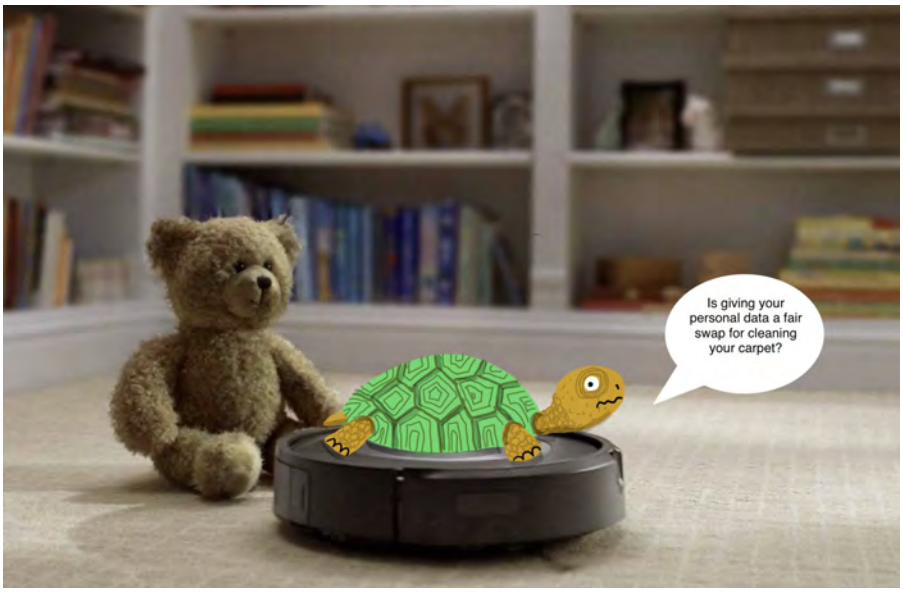


Figure 33: Visual prompt about data harvesting (Yamada-Rice, 2023)

Figure 34: Visual prompt about data harvesting from rental bikes (Yamada-Rice, 2023)

Figure 35: Visual prompt about data harvesting from smart watches (Yamada-Rice, 2023)

The prompts above also linked to our previous Countermeasures project that similarly sought to understand what children thought happened to the data sensors collected.

3.3 Development of Zines

3.3.1 Developing Ideas & Gaining Feedback

During the second KE event, Richard Nash presented an outline and proposal for a series of practice-based activities with children that could be used to open up discussion. The suggested activities were centred on zine-making that included a sequence of exercises based on character design, visual storytelling and flash fiction. The initial concepts focused on exploring notions of a digital or online self, and what this might mean conceptually for aspects such as anatomy of a character as well as health and wellbeing. This prompted questions such as interpreting ideas of what a healthy diet might be or bacteria and viruses and how children might make these connections.

3.3.2 Workshop with Research Group

A collaborative workshop with the research team was developed and led by Nash to explore how our combined insights and ideas could be synthesised into materials and activities to work with children (Figure 36). Members of the research team were asked to create a blank A2 sheet-size zine to question and reinterpret the suggested activities instead of answering them. This led to a series of variations and new approaches to take further. A range of paper-based and physical materials were provided, this included photocopied materials as well as blank materials of various stocks and sizes. As a research group we were asked by Nash to respond in the blank zines through drawing, writing, and collage using the materials provided. At the end of the workshop, the zines were shared amongst the researchers where reflections and further ideas were added through Post-it notes. See the example response below (Figure 37).

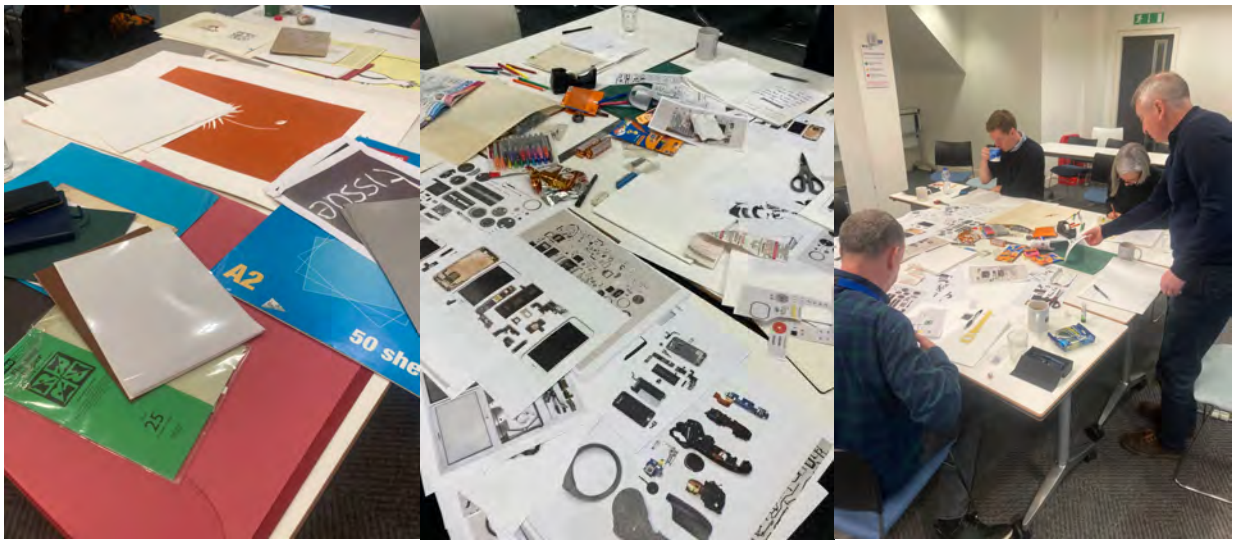


Figure 36: Zine-making workshop with research group (Nash, 2024)

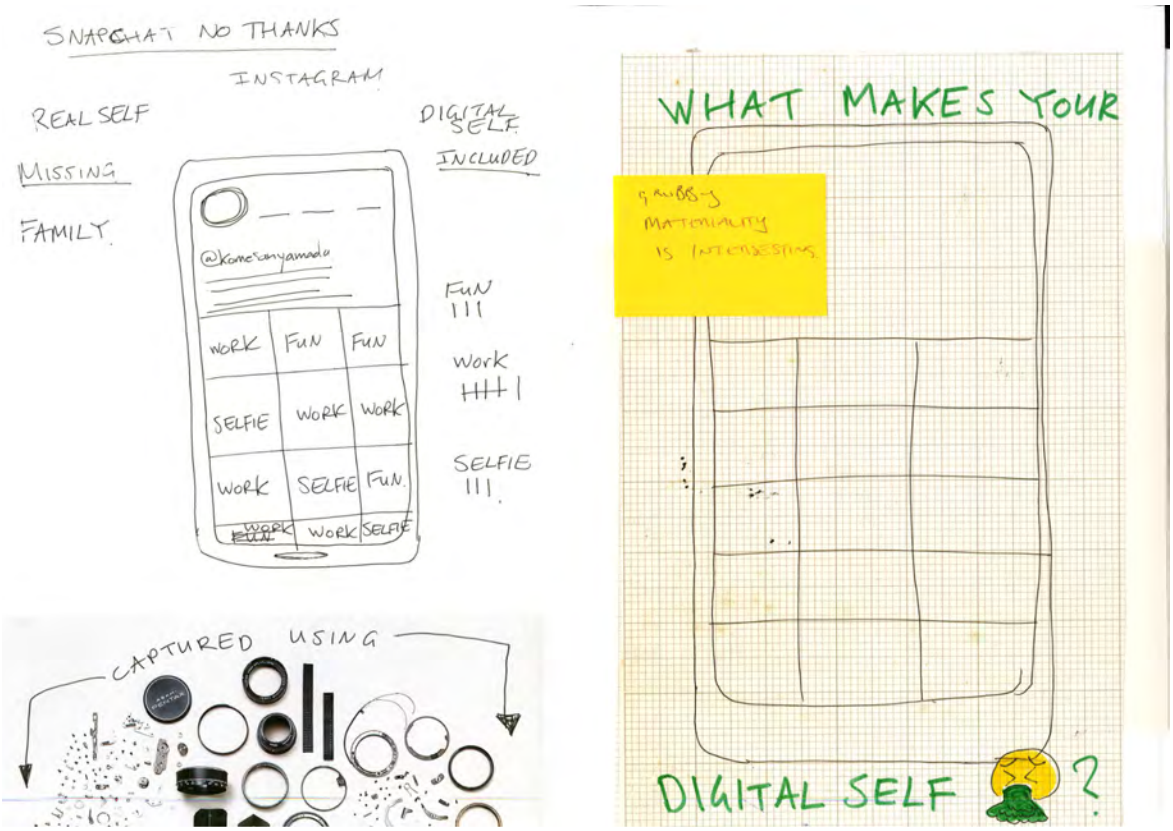


Figure 37: Example reinterpretation of exercises by Yamada-Rice during workshop (Nash, 2024)

3.3.3 Developing Materials

Following the workshop, the materials were digitally recorded and shared via a Padlet page (Figure 38). The workshop responses were collated with other aspects of the research to that point, including reflections on the KE events and the series of illustrations created by Yamada-Rice as presented in the previous section. The examples were spatially arranged to see where there were thematic links. Through this process, four core areas emerged, these included smartphones and social media, smart devices and data, AI, and gaming and consoles. The process led to considering how the workshop zines could be developed with potential prompts and activities and any materials that might be relevant to include.

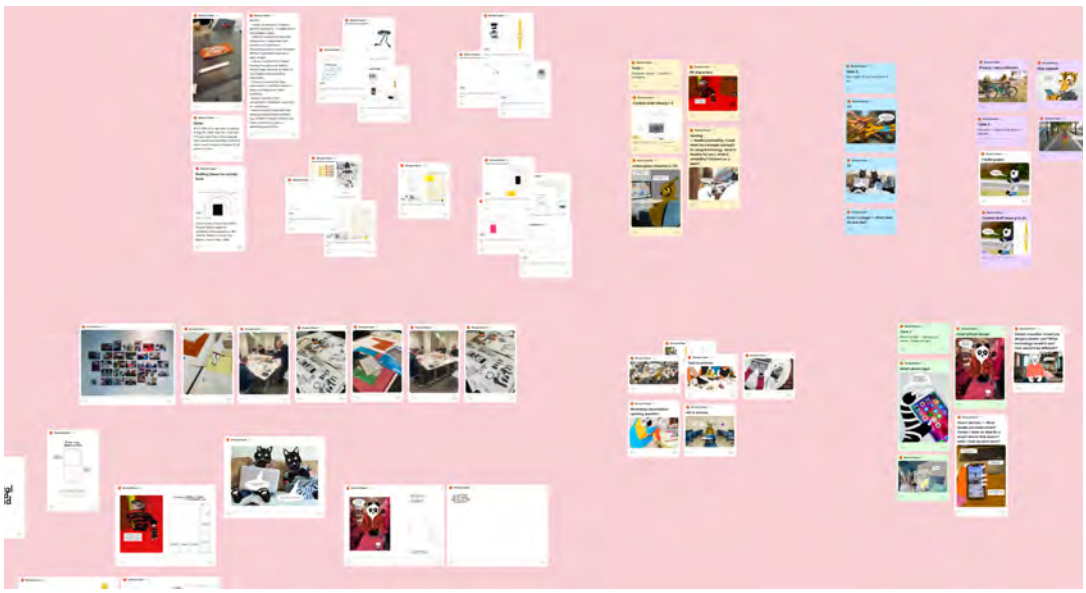


Figure 38: Crop of shared Padlet page containing collated resources, materials and work-in-progress (Nash, 2024).

Four activity zines were developed, each focussing on one of the identified core areas. Each of the zines were formed from eight pages including covers. The design and artwork for the zines were developed iteratively using a mix of digital technologies as well as low-tech methods, drawing and physical collage. This method of working and resulting aesthetic was intended to encourage play and mark-making through suggesting how the zines could be used and worked into. This included using an online type generator to emphasise familiar technologies and languages in primary education materials. Each zine was designed to be unbound allowing the pages to be separated and reassembled if required. This was also intended to facilitate an ease of documenting the children's responses and therefore allowing the children to keep what they had made.

Figure 39: Double page spread from one of the four prototype zines. This example explores paper-based methods for app design (Nash, 2024).

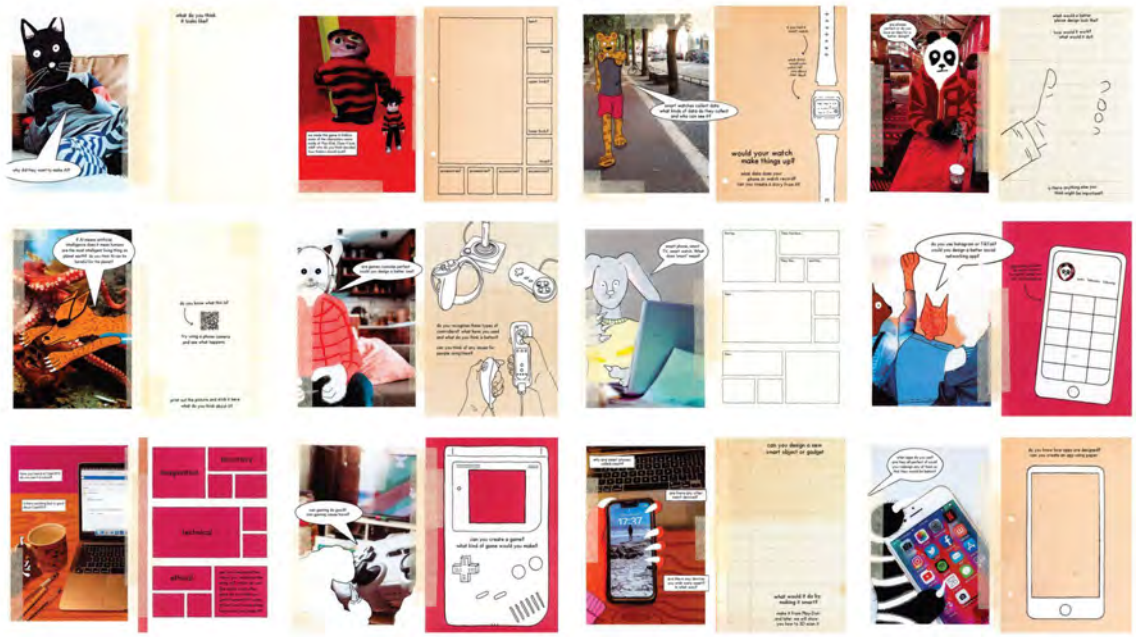


Figure 40: Range of exercises presented as double-page spreads from all four zines (Nash, 2024)

Directions for activities and open-ended questions were paired with illustrations to prompt the children to think critically through their responses (Figure 40). The range of activities varied from; (1) working into the zine using drawing, writing or stickers; (2) working with the zine's pre-cut windows or reveals for paper-based game design or app development (Figure 39), (3) Using the zine with additional materials such as responding to prompts with LEGO™, Play-Doh™ and mask-making (Figure 41).

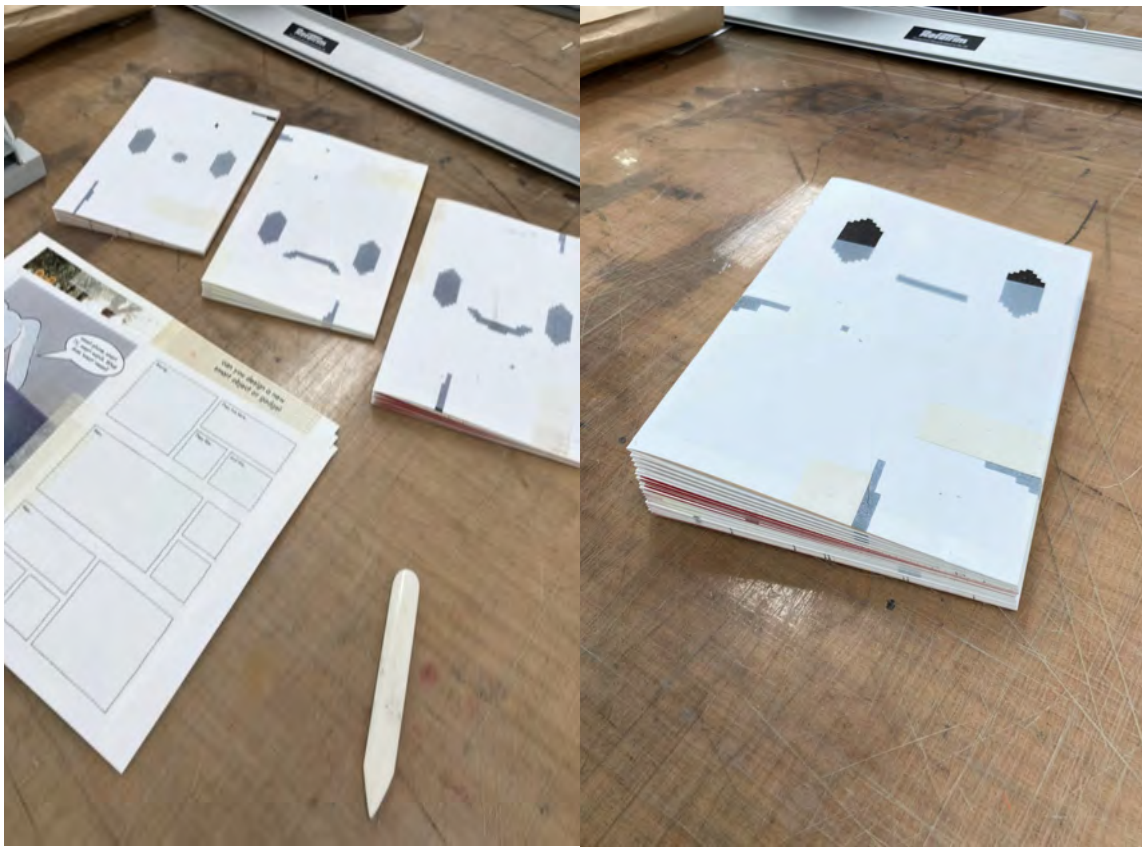


Figure 41: Limited print run of completed zines (Nash, 2024)

3.3.4 Designing the workshop lesson plan

A lesson plan was developed based on establishing four table stations, one for each of the four zines. This initial plan provided a basis in which the workshops were tailored further to each table location. As outlined in the next section, in delivering the workshops the full scope of the zines were reconfigured and reduced based on understanding the specific environment of each workshop location, access to technologies and materials, and the number, age range and specific learning needs of the children participating. While the zines were not used in their entirety, they were made available to be completed by the children after the workshops and with further scope to be made available digitally after the research study. The workshops focussed on three specific activities linking the zine pages with physical materials. Technologies were introduced during the workshop activities using Apps such as PolyCam (Figure 42).

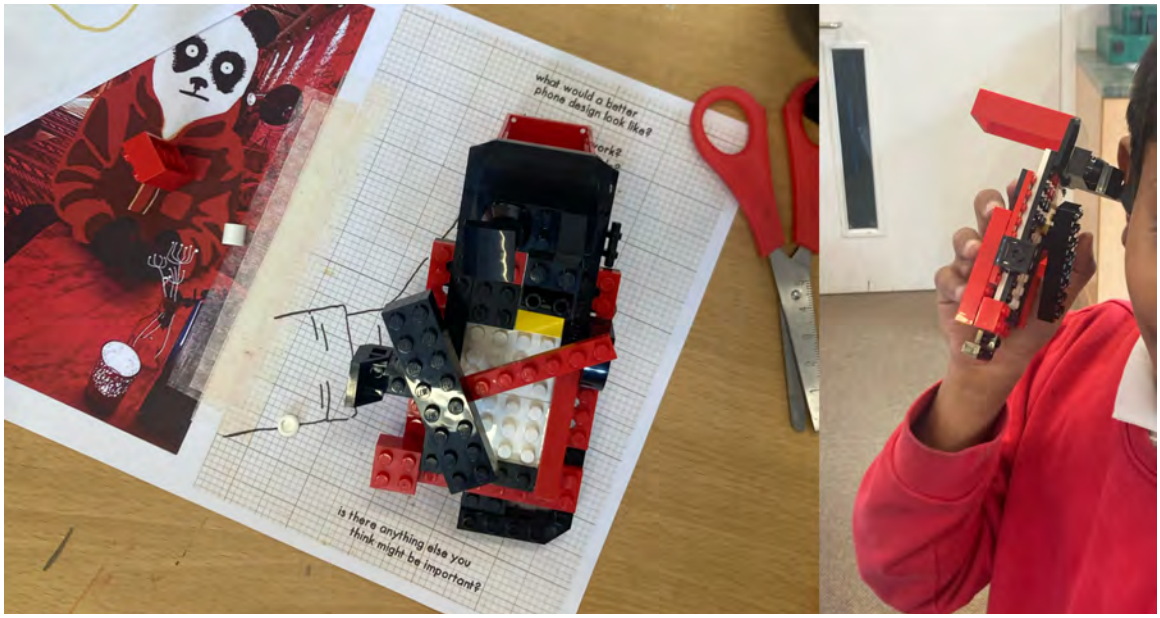


Figure 42: Zine prompt with LEGO (Nash, 2024)

Figure 43: Zine prompt with mask-making. Left image captured from PolyCam app (Nash 2024)

3.4 Workshop Materials Conclusion

In conclusion, the process of developing the materials highlighted the importance of collaboration and co-production. The KE event and subsequent workshop to reexamine and reinterpret the suggested activities proved valuable in synthesising the expertise, insights and experiences of the research group. Building on previous insights (Nash, 2022), three findings came out of the process:

1) Importance of co-production
2) Thinking through making
3) Agency of physical materials

As outlined above, while the zines were not used in their entirety for every workshop the intentional design decision for them to be reconfigured did prove purposeful in the delivery and as a result were less resource dependant. Where the limited print run of zines was used within the context of the community group, as outlined in the next section, this opened up a broader range of activities for the children to chosen from, and therefore enabling differentiation and individual choice which was especially important considering the attendance was unknown beforehand. The remaining printed zines were given to the community group to reproduce for future use for their own opportunities to run workshops.

The selected zine pages used across the workshops worked effectively in combination with the physical materials. For example, many children placed their LEGO™ phones onto the illustration page potentially denoting a sense of completion. The zines also provided differentiation working with the children to provide verbal, visual, and textual instructions to each of the activities. It is intended for the zines to be developed further beyond this research study as well as made available as digital downloads with some suggested activities for how to use them.

Section 4
Study Background

Section 4: Study Background

4.1 Study Introduction

This section outlines the decisions that were made for the study in terms of the aims, objectives and research questions, as well as the workshop contexts and ethical issues. After this we go on to outline the methods used to collect and analyse the data.

4.2 Aims, Objectives & Research Questions

Within the above context, this project focused on children's attitudes to concepts of Digital Good/ bad. It did this by scaffolding physical materials with digital ones for reasons of accessibility and as a deliberate stance to embrace hybrid materiality in making as ecological good practice.

The aims/objectives were:

1. To establish a specialist network of researchers and practitioners from academic and commercial organisations, whose work intersects with emerging ethical questions related to children's use of digital technology. (This was achieved in the knowledge exchange events).
2. Through network events, complete a collaborative literature and practice review related to this topic, and identify key questions for research.
3. To develop research methodologies that use both analogue and digital creativity to engage children in questions related to their use of technology and to share these with the wider Digital Good Network.
4. Conduct small-scale research with children aged 8-13 to better understand their positive and negative attitudes towards digital, virtual, and emerging technologies.
5. To evaluate children's engagement/disengagement with the workshops and insight into whether children have explored these topics previously and if they would like to learn more.
6. To report research findings back to the wider Digital Good Network and identify gaps and topics for future research.

The research questions were:

1. What do children aged 8-13 consider are the positive and negative aspects of the digital devices that they use?
2. How would children aged 8-13 wish to change the digital devices they own in the future?
3. How do children's concerns about digital technology compare with issues raised within existing research and policy?
4. How can physical and digital creativity be used to help children aged 8-13 discuss their attitudes towards technology?

4.3 Workshop Context

The initial aim was to undertake workshops with the last two year groups of primary school and the first two of secondary in Bradford and Plymouth. Both Bradford and Plymouth have high levels of disadvantage, meaning many children are directly affected by digital poverty, but they are also in very different geographical locations.

We invited Bradford schools to take part using contacts within the Bradford Active Schools Network. However, despite several schools being initially interested in the end none said they could accommodate the project.

Schools in Plymouth were contacted initially through an email sent to every primary and secondary school outlining the project and asking for participation, but none replied. In the end we were able to make direct contact with some teachers in specific schools through a PhD student at the University of Plymouth who was teaching in some of the schools. The direct link to teachers allowed access to undertake research workshops with seven classes of Year 3 to 6.

From here we also sought contact with home education students via local contacts. The initial idea was that home education students might be using technologies differently from those in schools or have alternative ideas about it. Invitations were shared with home education students via a local community group (Nudge). This was also not straightforward. Initially no families responded, and when the community group enquired about why it turned out that the invitation to take part in the research workshops had been shared on an online group forum with a couple of families mistakenly linking university involvement to that of the Local Education Authority, which was unwanted. In the end it was decided that one long workshop would be offered as a drop in at Nudge Community Builders to see if any local children or children of families who worked there might show up. This workshop had 6 children attend from diverse backgrounds, ages and interests in the topic.

Finally, we held one more class workshop with a primary school in London that was known to one of the project team members. This took place over a day with three team members in a Y5 class (aged around 10). It was a diverse group of 30 children, of mixed abilities in a large three-form entry school, in which children were used to voicing their opinions on a range of topical issues. Additionally, the class was taught by the ICT co-ordinator in the school who welcomed the workshop as being of potential benefit to the other Y5 classes.

We were unable to recruit any secondary school children to the project (with the exception of three that attended the community group session) within the timeframe. However, we worked with diverse and motivated, mainly upper primary pupils, totalling around 250 participants.

This history of recruitment is interesting in the context of this study because it shows how difficult it is to be able to offer any form of educational opportunities beyond the National Curriculum.

4.4 Ethics

Ethical approval was received from the University of Plymouth and best ethical guidelines for working with children were followed.

The 2023 Alan Turing Institute Report, 'AI, Children's Rights, & Wellbeing', identifies 'a growing concern regarding child exploitation in digital spaces, its intersection with unfair data and design practices in the technology sector, as well as poor or fragmented regulation' (Mahomed et al, 2023, p. 5). The report analyses 13 existing frameworks and notes a general lack of consistency in agreeing to the meaning, scope and processes of developing frameworks at the Intersections of Data-Intensive Technologies, Children's Rights, and Wellbeing. Furthermore, very few of these frameworks included children in defining key terms, values and ideologies.

At the core of our project is the idea that centering children's agency and participation as well as their wellbeing is an ethical imperative. This is supported by a number of other major reports, including the UNESCO report 'Guidance for generative AI in education and research' (Fengchun et al, 2023), which states that dominant 'GenAI providers have also been criticized for not allowing their systems to be subject to rigorous independent academic review' (Fengchun et al, 2023, p.14) asserting also the need for age restrictions: 'Most GenAI applications are primarily designed for adult users. These applications often entail substantial risks for children, including exposure to inappropriate content, as well as the potential for manipulation. In light of these risks and given the considerable uncertainty that continues to surround iterative GenAI applications, age restrictions are strongly recommended for general-purpose AI technologies in order to protect children's rights and wellbeing' (p. 21).

The UN Rights of the Child (1989) states that children should have a say in studies that affect them and as was shown in the literature review, we feel strongly that children should have a say in what makes a digital good society but also how emerging technologies such as AI are being developed, especially as those technologies have direct impacts on their lives. In other words, the initial stage of being ethical was to seek to include children directly in our study and builds on work by team members in other contexts of participatory research using hybrid arts methods (Flewitt et al., 2017; Nash et al., 2021; Potter, 2024; Yamada-Rice & Dare, 2024).

To do this, we adhered to the principles of the British Educational Research Association guidelines on ethical research (BERA, 2018) which sets out standards on informed consent, and particularly the rights of participants during data collection. We followed recommended protocol throughout, including meeting with schools beforehand and explaining the research workshop activities to ensure they were comfortable. We created and sent out Information Sheets and Consent Forms to parents and sought informed consent from children. To do this, we produced an age-appropriate information sheet in the form of a comic (see Figure 44) and told children about the project and who we were ahead of starting research activities. Children were given the chance to ask questions, which many children did and then asked to provide verbal consent. Simultaneously, the research group looked for signs of dis-consent and reminded children that their involvement was voluntary and that they could withdraw at any time.

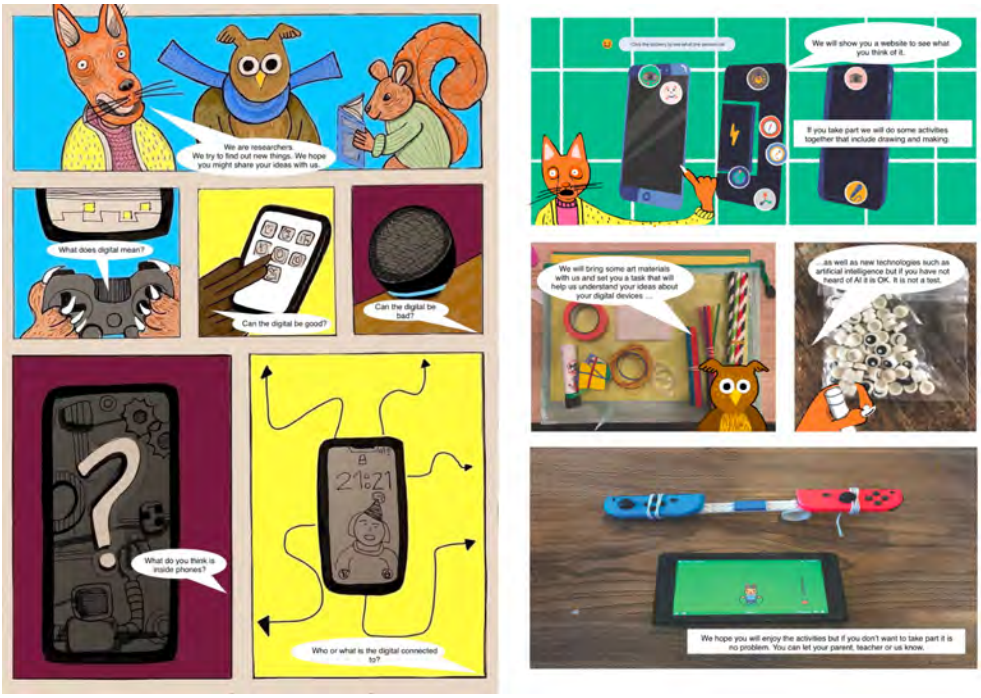


Figure 44: Information Comic for Child-participants (Yamada-Rice, 2023)

Finally, we consider the use of hands-on methods of co-design and playful making to be especially engaging for children relating to their preferred ways of communicating and being in the world and thus can also be considered ethical best practice. More about the overarching methodology and methods are discussed in the following section.

4.5 Methodology & Methods

As noted above the methods in the project built on the wide experience of participatory research by team members and colleagues, drawing particularly on 'making' and hybrid arts practices methods (Flewitt et al., 2017; Nash et al., 2022; Potter, 2024; Yamada-Rice & Dare, 2024). In this way the methodological stance was closely informed by Tim Ingold's ideas of knowing the world through making (Ingold, 2013) which chimed well with a heavy initial focus on thinking through drawing. This can be seen in the development of the visual prompts that arose directly from the knowledge exchange activities.

Participating in this project and observing the way in which children and adults make meaning through their engagement with materials and with each other, confirms the epistemic nature of making and the value of arts education and arts-based research methods. The combination of drawing and worlding (Palmer & Hunter, 2018) through making masks and models could clearly be extended by engaging children in animating and enacting the ideas and processes they have instigated through play. Investigating ways in which enacting and animating their ideas might evoke collective and individual agency as well as holistic technical knowledge (including and going beyond operational processes) is a potentially rich area of research, specifically in relation to emerging technologies and assemblage theories (Deleuze & Guattari, 1988). Incorporating the cultural, socio-economic and material ecologies all technology and design is entangled with is a logical progression of this project. The work of Crawford (2021) and DeLanda (2016) as well as Fortnum and Fisher (2013) among many others has informed the ongoing development of our approach and has significant scope for widening children's participation in the emergence of new technologies in a way which aligns with the UN, UNESCO and Alan Turing Institute findings as discussed in this report.

As stated in the end notes, it would be very interesting to research in more detail the origins and movement of children's ideas about AI and wider technologies - do they form these opinions through material engagement with technologies or through family, friends, games, phone conversations, TV or films? It is inappropriate to jump to unfounded conclusions and designing a further process of research could be another trajectory for this project.

4.6 Approaches to Data Analysis

Analysis of a relatively large, mixed-method dataset, comparing images, text, audio and video recordings is necessarily complex. The focus for this final project report, given the time constraints, was on an initial pass-through, gathering thematic congruence across the data in each location and then seeking commonalities and patterns between the research sites. Themes relating to the overarching aims of the project were explored for their overall salience and information value in the children's work (after Kress & Van Leeuwen, 2020) and further attention was paid to the affective responses generated by the children. Whilst this was a relatively straightforward process with the image data, the media produced was more complex to analyse without access to the full range of expression, given that the videos were recorded with anonymity in mind, and faces were not shown.

The focus instead in the videos used for analysis was on limited gestures from hands in shot and relied mainly on the post hoc recorded audio descriptions of the makers as they told the researchers about their creations in LEGO™ or Play-Doh™. Inevitably, a more detailed and systematic return to the data will generate sub-themes and further complexity appropriate to what John Law (2004) describes as the 'mess' of the social world. We were seeking to employ elements of multimodal discourse analysis alongside thematic analysis (Kress, 2011; Potter, 2024)

The kinds of data to be analysed comprised sets of photos which recorded the responses to the prompts around technology and AI. These generated personified images of AI itself (directly onto the masks), or Avatars (in two of the research sites), ideas for new types of phones, or images of new smart devices being constructed

Table 2 below outlines the range of data from just two of the sites as examples:

Research Site & Age Group	**Audio files**	**Images (AI masks, Avatars)**	**Video**
LG Primary (Year 5 and 6)	35	62 [27 AI 30 Avatars, 3 making, 2 phones]	11 1 AI, 10 Avatars
WC Primary (Year 6)	130	77 [25 AI 9 Avatars, 17 making, 15 phones, 11 smart devices]	13 AI 2 Avatars 6 phones, 9 smart devices

Table 2: Data collected in relation to two workshops sites

Table 3 below summarises the locations of thematic salience in the datasets in relation to the original research questions:

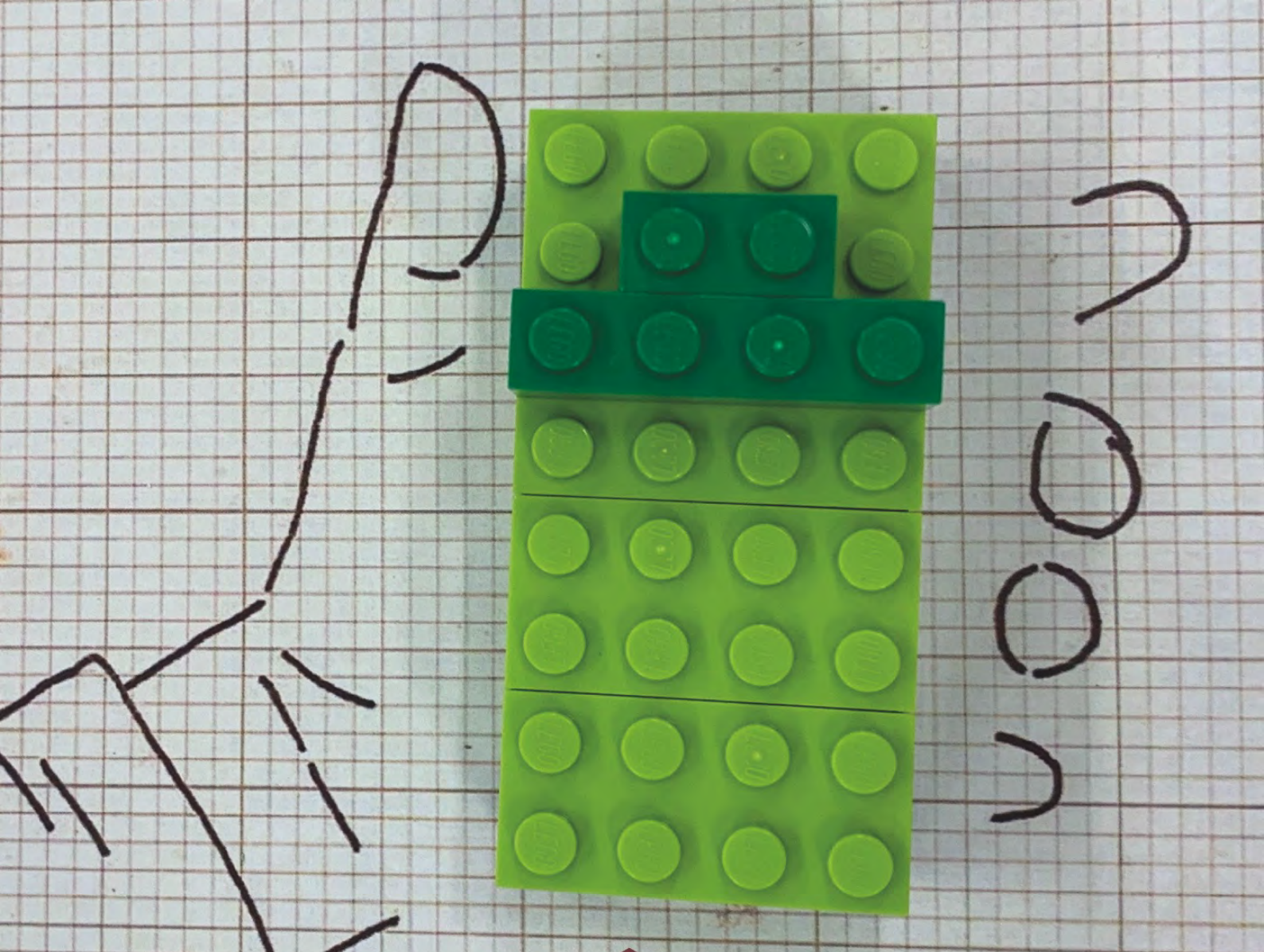
Research Question	Examples of Locations of Thematic Codes in the Datasets	Example Emergent Salient Themes
What do children aged 8-13 consider are the positive and negative aspects of the digital devices that they use?	Expressions on masks, affective responses to interview questions, gesture and intonation (audio and video)	Surveillance, health monitoring, wellbeing and entertainment
How would children aged 8-13 wish to change the digital devices they own in the future?	Projected future uses of smart devices (smart making, audio)	Ownership, agency, security
How do children's concerns about digital technology compare with issues raised within existing research and policy?	Wider conversational elements, affective responses (audio, masks)	Environment, climate change, loss of privacy
How can physical and digital creativity be used to help children aged 8-13 discuss their attitudes towards technology?	Reflections on the task (drawn imagery, audio and some video content)	Time, engagement, invention/inventiveness

Table 3: locations of thematic salience in the datasets in relation to the original research questions

In section 5 of this report, we draw on examples from the data, taken from across the range of materials collected and in each of the sites, expanding on the images, gestures, speech acts and artefacts created in order to suggest pathways into further analysis and follow-on project work.

4.7 Methodological Conclusions

Our approach to the methodology was to develop a way of working with children that would allow them to express ideas connected to the research topic that might be hard to express through other means. We have found in previous work we have undertaken that some aspects connected to discussing digital technologies are easier to share knowledge about than others. For example, it is easier for children to explain digital sensors, what they do and the data they collect about them, if the cause and effect of those sensors are visible, i.e. facial recognition to unlock a phone (Main & Yamada-Rice, 2022). Therefore, we sought to develop a series of activities that could allow children to think, explore and express their ideas through analogue and digital making. Some of the technologies that we used such as photogrammetry were also connected directly to the topic. In many respects these activities were successful in achieving this but there were also areas for improvement, for example the mask in the mask-making AI activity might have seemed sinister in appearance and led to some of the ways in which children negatively viewed AI. Despite such limitations, as a group we are clear that children must be brought into research about big world issues that affect them such as is the focus of the wider Digital Good Network, and that art and design are playful in nature, which better attunes to children's, especially younger children's preferred meaning-making practices. Art and Design methodologies are also designed to create a slower more prolonged space for thinking while simultaneously making that we believe allows children to articulate ideas that reading, writing and talking which are the modes of more traditional social science research methods might not be able to achieve.



Section 5
Findings

Section 5: Initial Research Findings

5.1 Introduction to Research Findings

As was described in Section 3 and 4 we made a set of visual prompts and workshop materials that responded to a wide range of technologies and issues that arose from discussing what a digital good society might look like for children and how to best allow them to contribute their ideas to the wider Digital Good Network. From this, due to time limitations in schools, we had to narrow down the scope of what we could achieve in the research workshops considerably, and chose to largely focus on four ideas: (1) children's general awareness of AI and systems, (2) if they have ideas for redesigning technologies that are already in their lives, specifically smartphones, (3) whether they understand the notion of smart objects and what other smart devices they could imagine being useful to their lives and (4) how they view their digital identity.

Children had many and varied responses to the prompts and activities across the research sites. Commonalities included focus and commitment to the tasks, in most cases. The hoped-for impact of 'making' as the key to hybrid arts practices unlocking affective, as well as knowledge-based responses seemed to have materialised. Below are some examples of children's thoughts on digital good and bad, grouped by the following themes (1) children's critical engagement with tech, (2) children and AI (3) whether children would design tech differently and (4) their ideas around tech and the climate crisis. These are initial thoughts deriving from the data. More detailed analysis and discussion will be presented in future joint publications.

5.2 Children's Critical Engagement with Tech

As with the prior Countermeasures project (Main & Yamada-Rice, 2022), in general children were able to critique tech easiest when it related to technologies embedded in their everyday lives and the features of these technologies were visible to them. For example, children were deeply engaged when asked if they liked the voices of Alexa or Siri:

> Child: *"Yeah, I've used Siri"*
> Researcher: *"Is it nice talking to someone rather than looking something up on a phone?"*
> Child: *"Nah."*
> Researcher: *"What's not good about it?"*
> Child: *"I don't know but like when you say something it sometimes says I can't understand."*

In addition, children were also articulate about wanting to be able to turn smart speakers off:

> Researcher: *"Do you have Alexa or Siri or anything?"*
> Child: *"I have Alexa."*
> Researcher: *"Do you like talking to Alexa?"*
> Child: *"No."*
> Researcher: *"What don't you like about talking to Alexa?"*
> Child: *"She annoys me."*

Child: *“What I don’t get is when you say to Alexa something she will completely mess it up. I was talking to my mum the other day and I was talking about biscuits and she [Alexa] said “Sorry I don't understand that”. And I wasn’t talking to you or she will be like “I've found 5500 results for biscuit on your phone.”*
Researcher: *“What does that make you feel?”*
Child: *“It’s really annoying because you will say something to her and she just won't listen and then when you're not talking to her she’ll listen.”*
The class starts an animated discussion about when Alexa recommends things to you that you don’t want to buy.

Child 1: *“She listens to your conversations. I hate that.”*
Researcher: *“Is there any way you can stop Alexa listening to your conversations?”*
Child 1: *“Turn off the plug.”*
Child 2: “Also you can turn her off with the button.”

Perhaps turning smart speakers off is something we should be encouraging more given that researchers such as Steeves (2020) is telling us how “always on” smart devices are collecting data from children about how they are feeling in order to market products to them.

The same was the case with discussion on tracking apps, which were common to most children and as a result they were able to articulate opinions for and against the software:

Researcher: *“So who has a tracking app on their phone?”*
Child 1: *“My parents trust me.”*
Researcher: *“OK hands down…Can you also see where your parents are?”*
Many children start talking at once with a divide between yes and no answers.
Child 2: *“Because they can also turn the tracking off.”*
Lots of discussion starts among children on the topic.
Researcher: *“So do you think it’s a good thing that your parents can track you?”*
Child 3: *“No.”*
But more children shout over the top *“yes.”*
Child 4: *“Yes in case you get kidnapped.”*
Child 5: *“What happens though if you want to go for a night out because my phone buzzes if I am too far away from home, and say you want to go for a night out and your 18 and above, and your parents are getting worried because you said you’d be home by 10 and it’s now like 12 or 1‘o’clock in the morning and they are like well where are they, and if your parents can’t track you then they won’t know where you are and if you’re safe.”*
Child 6: *“If you’re 18 and above I don’t think you’re going to get kidnapped.”*
Child 7: *“But what if I am at X’s house and my mum doesn’t know?”*
Child 8: *“Then you give her a god damn message.”*
A big debate rages on between the class of children.

For new technologies, such as AI, children tended to refer to broader cultural tropes rather than share deeper nuanced critiques in relation to their lives. This is discussed in the next section.

5.3 Children & AI

5.3.1 General Understanding of AI

Children had a tendency to reflect the broader, negative cultural tropes about AI which they associated with robots and cyborgs. They frequently mentioned ideas such as AI becoming more intelligent than humans, robots or AI taking over the world:

> Researcher: *"Has anyone heard about AI in the news before?*
> Class shouts out: *"Yes."*
> Researcher: *"What kind of things did you hear?"*
> Child 1: *"Scams."*
> Child 2: *"Will AI rise and kill all humans?"*
> Teacher: *"Did you actually read that in the papers or are you making up news headlines?"*
> Child 2: *"No in the newspaper it was like under the headline: Will AI kill every human?"*
> Teacher: *"Oh OK."*
>
> Child1: *"I saw on the news that there is an AI restaurant in Japan."*
> Child 2: *"Oh I really want to go there."*
> Researcher: *"What could the AI restaurant do?"*
> Child 1: *"The humans make the food and then AI puts it on the table."*

These examples show how the children were unable to go into the level of debate and impassioned perspectives as arose from the tracking app discussion and other technologies and software that they were more familiar with.

Similarly, in the mask-making activity, the majority of children that we worked with had heard of AI and described it as a robot.

> *"AI is like a robot that can tell you stuff." (Year 3/4)*

Yet, they did not seem to associate it with friendly robots and most of the imagery children chose to use on their masks was quite scary (blood dripping eyes, sinister eyes etc.) See Figure 45 as an example.

> *"They [AI] make stories. They give us stories. Most of them are made up stories but some of them are based on true stories (Figure 45)."* (Year 5/6)

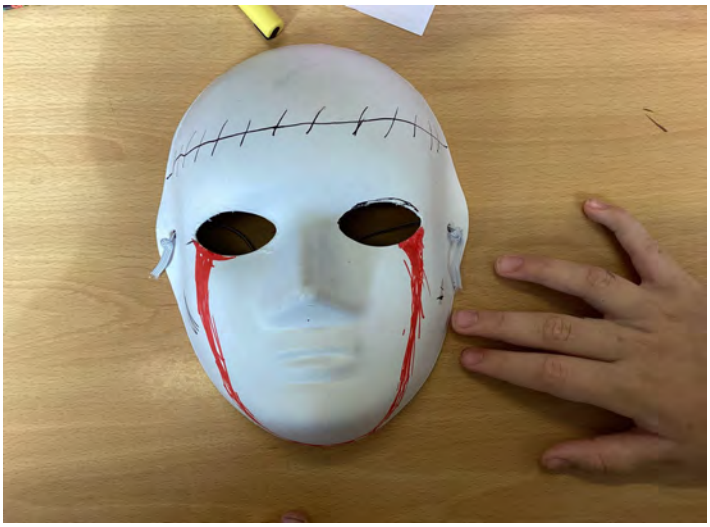


Figure 45: AI mask design with blood dripping eyes

"I made my mask look like this because Artificial intelligence known as AI can be pretty scary because it can be used in a lot of ways. By making my mask like this it shows how AI is depicted by some people (Figure 46)." (Year 5/6)

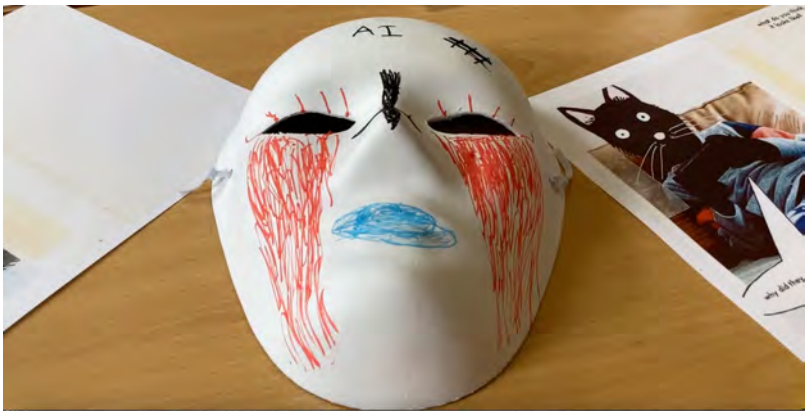


Figure 46: AI mask design made to look scary

This seemed to reflect a generally negative view of what AI represented. Children often associated AI with hackers, scammers, identity theft, money theft. etc. They also described AI as being something sinister that was masking itself as a human:

"This was designed because AI is trying to be like humans. I am hoping it can do boring jobs like cleaning or waiting in restaurants (Figure 47)." (Year 6)

Figure 47: AI mask designed to be disguised as a human

"This one looks like a human but it is being controlled by the microchip on the forehead (Figure 48)." (Year 6)

Figure 48: AI mask design with controlling microchip on forehead

Having said this, it is worth noting that we also thought the scary imagery might have been partially influenced by the affordances of the masks themselves. The blank masks could be viewed as a little sinister on their own, and children sometimes tried to use them to scare their friends in the workshop.

The children were best at articulating what AI was capable of doing in relation to actual uses they had tried such as with smart speakers and using generative AI to produce images:

"Artificial Intelligence is where you tell someone something and they can create images of what they might look like or sound like." (Year 3/4)

"AI chess is basically a computer that is playing chess against you." (Year 5/6)

"Chat GPT." (Year 5/6)

"SnapChat has AI. It's called My AI." (Year 5/6)

When children had specific experiences such as those above, they were able to critically engage with the technology best. For example, in relation to creating generative art, some children said they liked it because *"it was imaginative"*, *"beautiful"* or *"quick"* but others expressed disappointment in how it was unable to make the images they hoped for:

Researcher: *"Have any of you tried to make art with AI?"*
Several children: *"Yes."*
Child 1: *"I am a drawer."*
Researcher: *"So those of you who have, how did you find it?"*
Child 2: *"I tried to do an AI comic on an app and it just came up with Spiderman."*
Researcher: *"So, were you happy with that?"*
Child 2: "No it didn't do what I asked for."

Researcher: *“What did you ask for?”*
Child 2: *“I was making a Biscuit Boy comic.”*
Researcher: *“Who is Biscuit Boy?”*
The class shouts out: *“Fin”*
Teacher: *“Because Fin likes biscuits, he’s got himself a nickname.”*

Relatedly, children had specific questions in relation to AI and things they liked in their lives. For example, one child asked if anime has anything to do with AI, a question we put to the class:

Researcher: *“Does anyone think anime has anything to do with AI? You think it does. How does AI have anything to do with animation do you think?”*
Child: *“To make a character and to make it move.” (Year 5/6)*

There was a general assumption that AI would make mistakes and get things wrong. This was sometimes based on children's first-hand knowledge like the use of AI in the comic app above but also in relation to using applications like Siri or ChatGPT and receiving wrong answers.

5.3.2 How Children Think AI Works

Most children had limited or no knowledge of how AI works. Yet, children were aware that AI was connected to computing and the way they visualised AI with regards to this was interesting. They often tried to draw 'Code' (usually binary code of 1s and 0s), Glitches (usually the colourful pixelated glitches you see when photos or video fail to load properly), or circuit boards (the lines and dots of PCBs), such as can be seen in the examples below:

“The blue lines are the electricity. The dots are to show if there is a problem in the network. The red dot shows problems. The grey is robotic. It has horror eyes (Figure 49).” (Year 6)

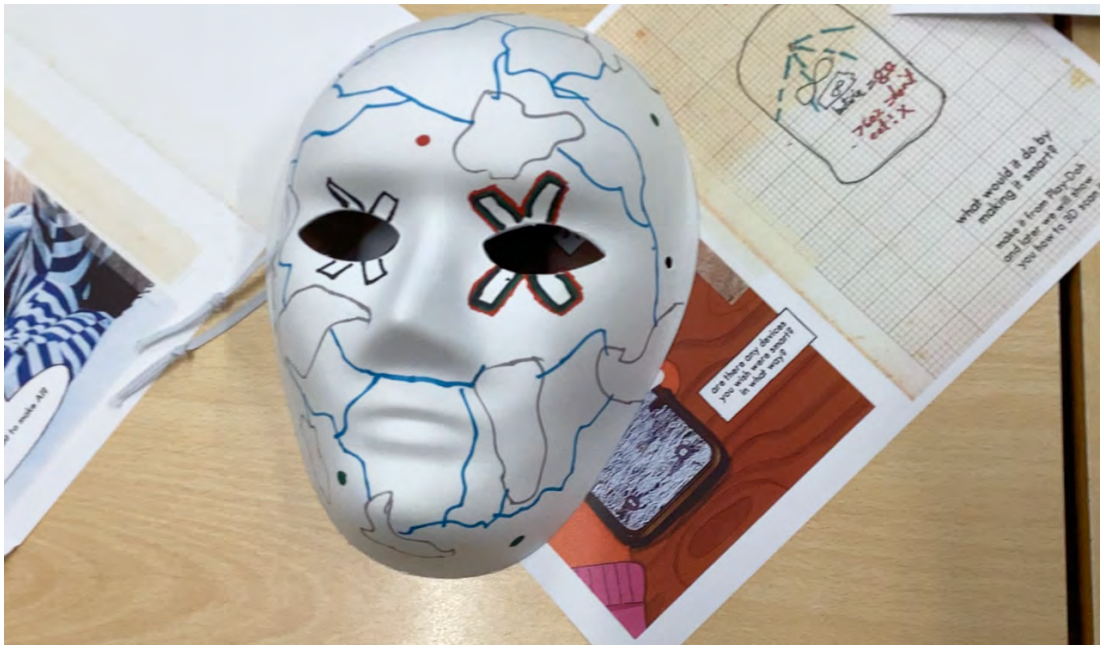


Figure 49: AI mask designed to show a network and horror

"The black symbolises a digital circuit of AI (Figure 50)." (Year 6)

Figure 50: AI mask designed to show a digital circuit

"This one is made to look like a glitch in the system (Figure 51)." (Year 6)

Figure 51: AI mask made to look like a glitch

"This mask has a nose that is pixelated, and the top is the pattern the same as that of Siri (Figure 52.)" (Year 6)

Figure 52: AI mask designed with a pixelated nose

This kind of imagery was dominant, but children usually couldn't express why they chose this imagery, or what influenced them, with the exception of one child who described clearly the first time she heard about AI and why she had therefore used certain imagery:

> *"This is AI glitching. The space on the right of the forehead is going to be full of apps. I first heard about AI on YouTube (Figure 53)"* (Year 6)

Figure 53: AI mask designed to show knowledge gained from YouTube

It should also be noted that some children struggled to come up with an idea for what AI looks like. In these cases, they drew things like clowns or cats (likely inspired by the visual prompt they had been given that also had a cat) (Figure 54)"

Figure 54: Making a cat mask when they were unsure what AI is

As was also found in the Countermeasures project, children were drawing in specific elements of technology but then struggling to know how it was connected to the workings:

Child*: "I tried to make my mask look like a CPU."*
Researcher: *"What is a CPU?"*
Child: *"I can't remember what it stands for, but I think it is like a processing unit"*
Researcher: *"So do you think AI has something to do with computing?*
Child: *"Yes." (Year 5/6)*

Again, it was easier for children to relate to design decisions made for technologies if it directly related to personal experience and they were given specific examples:

Researcher: *"Do you like Alexa's voice? Put your hand up if you don't like Alexa's voice? That's quite a few of you. Would anyone like to say why they don't like Alexa's voice?*
Child 1: *"Because she keeps on talking all the time. Acting like she's so smart when she isn't so smart."*
Child 2: *"I really don't like Alexa's voice because it is too boring. It doesn't really have any expressions."*
Child 3: *"I don't like Alexa's voice because she is always talking and sometimes, she talks over us."*
Child 4: "I don't like Alexa's voice because it is creepy."

Also, as with the Countermeasures project (Main & Yamada-Rice, 2022) we found that the technologies themselves deliberately mislead children by creating myths:

Child: *"The reason I don't like Alexa is [that] one time at my friends house I told her to shut up and she said that Santa wouldn't give me any presents. Also, in my old school people said she is really scary and is a slender" [This comment causes uproar from the class].* (Year 3/4)

The findings also gave some initial insight into who they thought was making AI:
Researcher: *"Who do you think is making AI?"*
Child 1: *"Elon Musk."*
Child 2: *"The Government."*
Many more children shout out Elon Musk.
Child 2: *"So I saw this video of an AI bird with like a speaker inside it and it was like a completely robot bird with fake fur and when they took it apart it had like a government symbol of approval on it."*
Researcher: *"So you know you said Elon Musk makes AI."*
Child 3: *"He makes Teslas."*
Researcher: *"… why is he making it [AI]?"*
Child 4: *"To build Cyber Trucks."*
Child 5: *"Because the government is secretly aliens."*
Child 6: *"AI is used to scam people. Why would Elon Musk need to scam people? He's like one of the richest persons in the world."*
Child 7: *"He's the richest person but he won't protect the king."*
Child 4: *"He makes AI cars."*

These initial conversations with children about who is behind AI development seem to suggest an early awareness of it being made by the wealthy to serve themselves. It offers an initial springboard for further work to dive deeper into this area as one part of critical thinking in relation to emerging tech.

5.4 Would Children Design Tech Differently?

5.4.1 Designing Phones

Phones, made from LEGO™ and from Play-Doh™, were a further workshop feature with children being invited to make a new kind of phone. The intention for this was to be able to understand what children like about phones and areas they would potentially want to alter or improve.

Overall, very few children came up with an idea for a phone that was radically different from past or present designs (as is seen in the examples below) with the exception being that screens were often smaller or left out completely. The preference for smaller phones might be partially because children found modern phones too big, with some saying they found them hard to hold.

> *"This is my phone, and you can Facetime, and you can text and you can play games. (Figure 55)." (Year 5/6)*

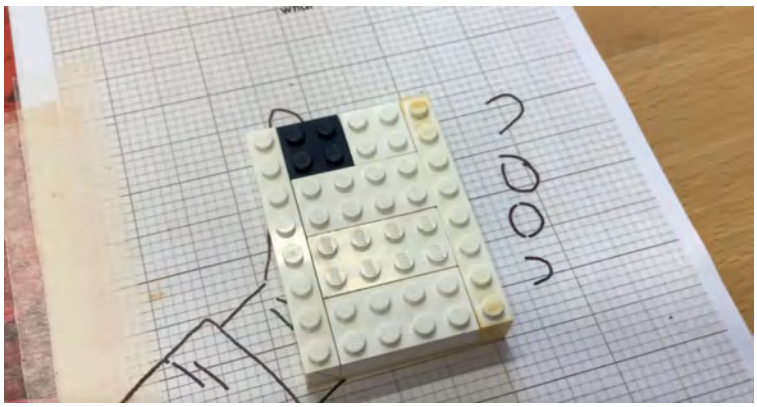


Figure 55: Phone design with Facetime, text and games

"This is an iPhone made out of Play-Doh. This is where you turn off and on and these are the games [the grey Play-Doh] (Figure 56)" (Year 5/6)

Figure 56: Phone design with on/off button and games

"I made a phone out of Play-Doh and these are like all the apps and then there is like YouTube, games, WhatsApp and you can text and call people from it and all that stuff (Figure 57)." (Year 5/6)

Figure 57: Phone design with YouTube, games and WhatsApp

"This button is YouTube, this is WhatsApp, this is TikTok and all the other apps. This is a cool phone (Figure 58)."

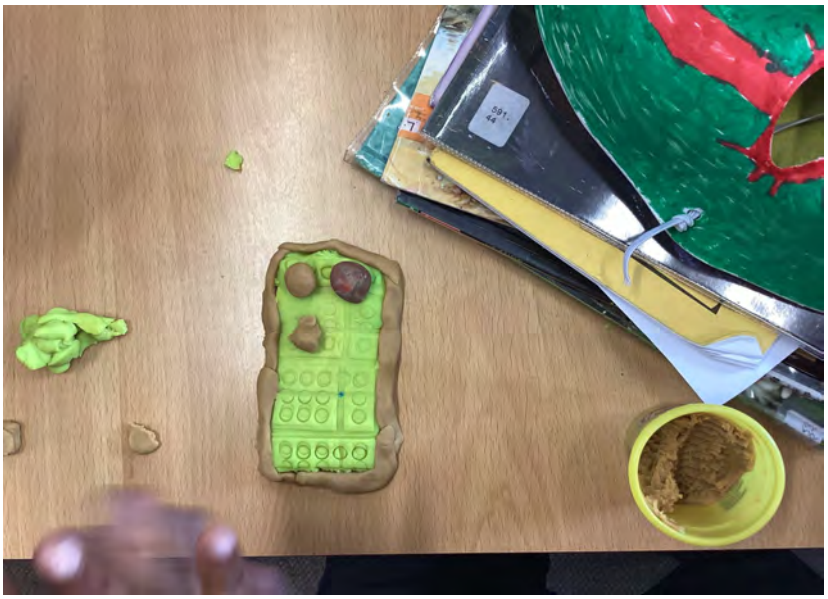


Figure 58: Phone design with YouTube, WhatsApp and TikTok

This might have been because for many children this age stated that they had only just got their phone or were waiting for secondary school for it, so phones even as they already exist were aspirational to these participants.

Partly, this idea seems backed up by the fact that some Year 6 (the oldest children we worked with) seemed to design phones with slight adjustments that would improve the phones they already owned, as the examples below show:

For example, one child created a phone with a stand and a projector on the back (Figure 59). (Year 6)

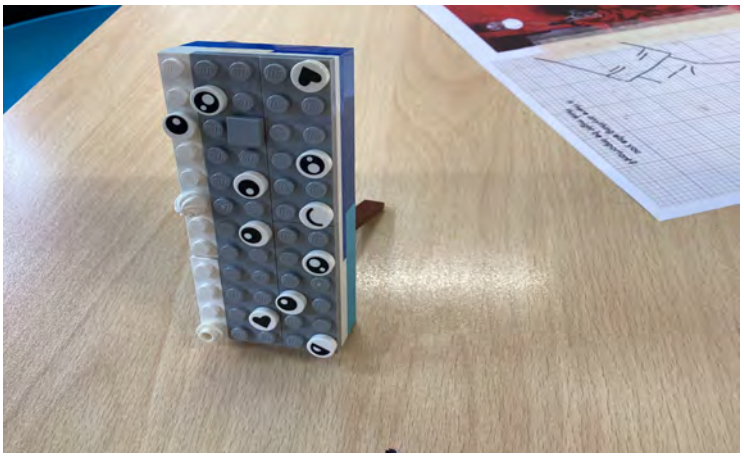


Figure 59: Phone design with stand and projector

A phone with a compartment for fuel in case you run out of fuel when you are in the car, and it also has a projector on the back (Figure 60). (Year 6)

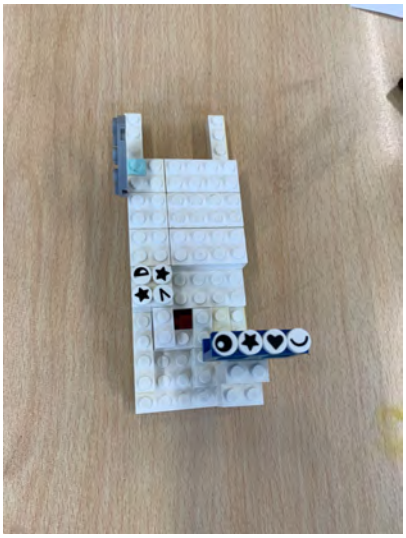


Figure 60: Phone design with a case for fuel

"This phone has a wheel that you can spin to take photos (Figure 61)." (Year 6)

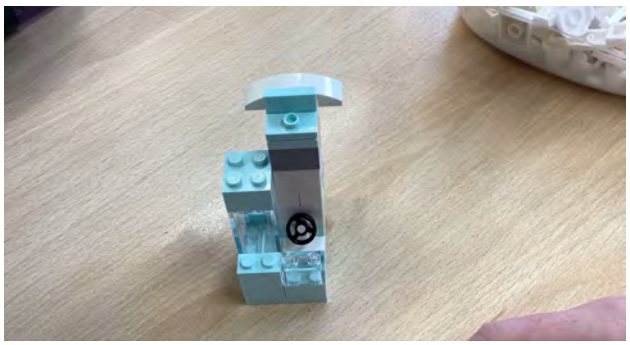


Figure 61: Phone design with a wheel for taking photos

Child: *"A big kind of thick phone but it's going to be quite tall".*
Researcher: *"What kind of features do you want your phone to have?"*
Child: *"Have a really big camera… and I'm going to be able to make the camera Zoom in."* (Audio only no image available).

The phone design activity allowed us to ask children how they would feel about not owning a phone or if phones could only be used to make phone calls but not for social media and gaming etc. In relation to this the concept of safety came up frequently.

Children associated phones with being able to call for help, letting their parents know where they are, tracking etc. Often these types of functions were what children added to their new phones.

> Child: *"There is a little red emergency button on the side and if you click it five times it calls the emergency services."*
> Researcher*: "Oh cool is that something you think is useful in a phone? That you can get help?"*
> Child: *"Yes." (Year 6)*

Perhaps related to the idea of safety being more important than apps, children also referenced old technology in designing their new phones. They were aware of, and talked about, brick phones. Some copied old fashioned landline telephone handsets.

5.4.2 Designing Smart Objects

Children's ideas for smart objects tended to fall into three categories, (1) devices that are essentially not needed as a technological intervention, (2) things very similar to smart objects that already exist or (3) fantastical designs.

With regards to the former, the following example shows how a child's idea for a device replicates something that could be done manually:

> Child interviewing a child:
> Child 1: *"So what have you made today?"*
> Child 2: *"I've made a sweet scanner."*
> Child 1: *"How does it work?"*
> Child 2: *"You technically have a part that you want to scan and then you will have a button and it will show it on a little screen."*
> Child 1: *"So does it tell you how many there are or if they've gone bad?"*
> Child 2: *"It tells you how many there are."*

Drawing on ideas from Crary (2014) around hybrid materialities to protect the climate, this might suggest a deeper need to talk to children more about how digital technologies consume natural materials and that children should be critiquing whether they are needed at all.

Some of the fantastical idea seemed to be related to warfare:

> Researcher: *"So yours is like a plane, like a super cool rocket ship. It's got wings and like a cockpit. Ok so tell me about your plane, what is it?"*
> Child: *"Ok so my plane is indestructible. It shoots smoke out of the back and then it has tasers. It has a lever to chuck out bombs at the bottom, which are there. And it can actually drive and it can fly or hover. It can crush things. Its pretty high so it can float in the water."* (Year 6)

"It a micro artificial intelligence with an earphone [beige piece on the bottom] that you put in your ear and it can do anything a plane can do like it can fly around. It can do anything that artificial intelligence can do. It can change your voice, and it can send waves to your brain and teach it to do stuff it couldn't do before in seconds (Figure 62)." (Year 8 community group)

Figure 62: Smart object design with micro artificial intelligence

Other designs were related to "get rich quick" schemes:

Child 1: *"So I have basically made a crystal ring and if you press the ring and think of something "Walam" it appears."*
Chid 2: *"So if I thought up an airplane ticket to Spain?"*
Child 1: *"Yeah."*
Child 2: *"No, a ticket to Hawaii- I would get it?*
Child 1: *"Yep that's the superpower."*

In some respects, this is not unlike the children's fairy tale of the Genie in the Bottle, but it also indicates that children seemed to confuse the word smart with magical or a superpower. Again, this resonates with findings from Main and Yamada-Rice (2022). Yet, when children were asked generally about what smart objects they could list and what made them 'smart' they seemed to equate the term with the usefulness of everyday digital devices:

Researcher: *"What makes something smart?"*
Child: *"So if you didn't have a phone, you wouldn't be able to message your mum so it has more access from your phone than in person."*
Researcher: *"So a longer range?"*
Child: *"Yeah, so say I am at my friend's, and I need to speak to my mum then it will be easier to use my phone so I don't have to go all the way home to speak to her."*

Child: *"Is a microwave smart?"*
Researcher: *"I don't know, what do you think would make it smart?"*
Child: *"It generates heat and it says the time on it."*

5.5 Children, Tech & the Climate Crisis

When asked directly if children thought AI was good for the planet all responded "No", but no one backed this up with reasoning directly related to AI. Instead, they brought it up in relation to other debates about the environment and technology which are more prevalent in the media:

> Researcher: *"Do you think AI is good for the planet or bad for it?"*
> The class shouts out: *"Bad."*
> Child 1: *"It uses electricity."*
> Child 2: *"Everyone says change to electric cars but that's actually worse than gas cars because they need loads of lithium which makes lots of pollution."*

Yet, children's concern for the environment emerged regularly during the varied research tasks but was often more nebulous and alluded to indirectly in discussion. On one occasion at one of the schools, we discussed generative AI, including image generators. One child, aged 10, requested an image from the AI Gencraft app showing 'a Chinese boy, aged about 14, wearing brown shorts and a brown T-shirt, standing in an apartment with a creepy expression on his face'. When she saw the image she expressed disappointment that it did not look right. When asked why she replied that he was her imaginary friend and the image did not look like him. When asked about the specifics of the space and his expression, the girl said it was because he was always worried about the environment and the end of the world.

Some of the discussions also showed the confusion children had with why Big Tech uses terms related to the environment such as the Cloud:

> *"There was one that was called Alexa. It lives in your house but also in the sky. I asked Alexa where it lives and it said in the sky." (Year 3/4)*

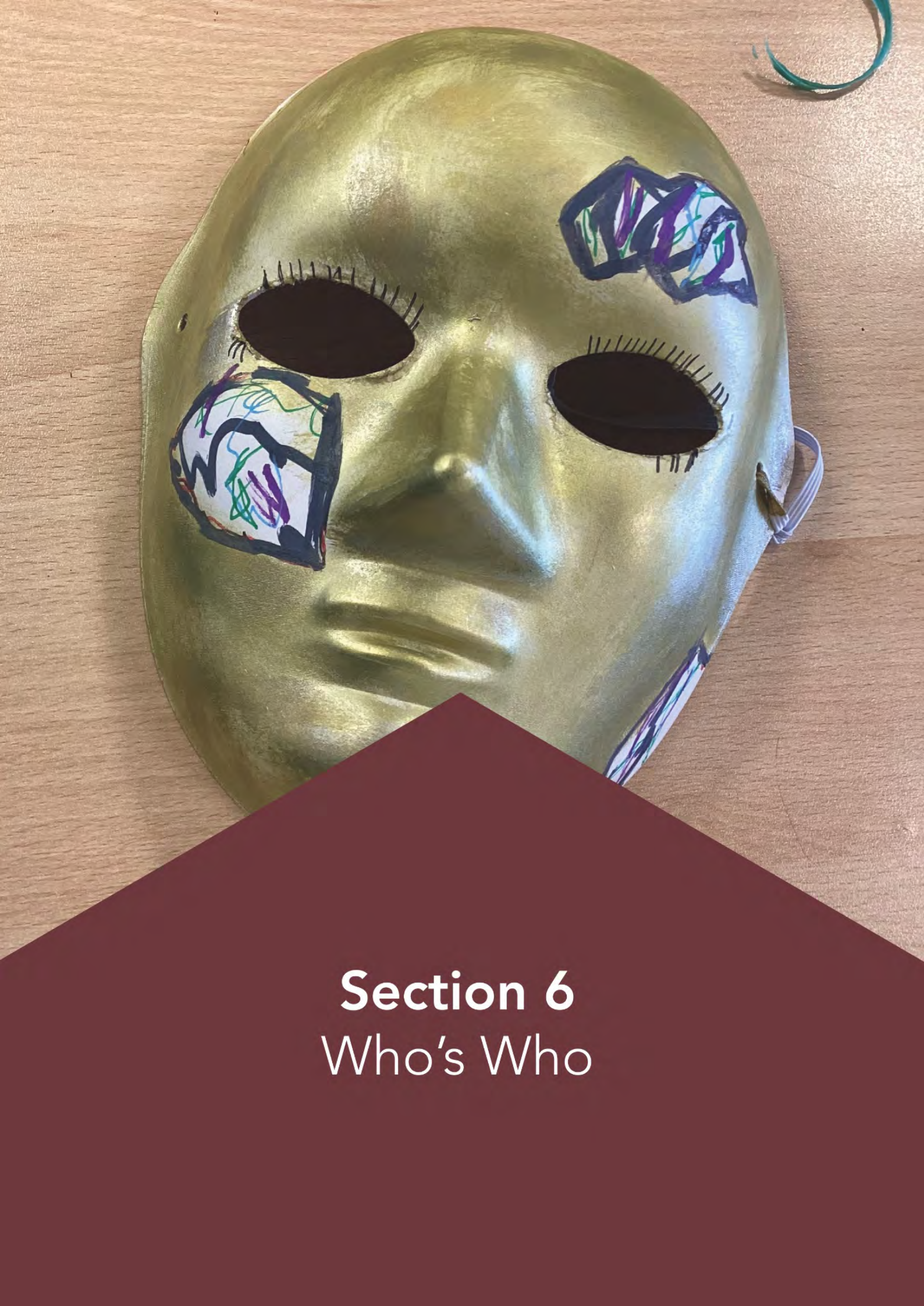
This seems to suggest that children could benefit more from understanding Steven Gozalez Monserrate's work (2022) outlined in the literature review that shows the materiality and environmental cost of the Cloud, but also it raises questions about why tech companies are deliberately misleading children.

5.6 Conclusion & Future Directions

Section 5 of the report has sought to show how initial engagement with the research data, although an early pass through of it, shows themes relating to surveillance, entertainment, ownership, agency, security, environment, climate change, loss of privacy, invention or inventiveness. In the last category were various devices made in the workshop which were modifications or hacks to current popular consumer devices, such as the Apple Watch™. These reflected some attempt to move what was an essentially open-ended, creative project into the realm of the real and known. But there were always overtones of new thinking and good general, critical awareness of the risk-benefit continuum along which the digital good-bad binary travels.

It would be very interesting to research in more detail the origins of children's ideas on data, AI, privacy, surveillance and all interconnected themes. Do they originate in family life and conversation, in games, from phone messages, TV and films? A future research project could fruitfully locate the origins of this knowledge in wider popular and media culture.

Moreover, throughout the project we were struck by this being the first time that anyone had consulted these children on matters of everyday entanglements with the digital. Certainly, it was the first time that anyone had researched their affective responses in this way, by making. We believe that this idea has further to travel and would welcome the opportunity to expand the reach of the research in a much larger project, and to include some international comparisons. This is especially important as stated in the literature review because children arguably cannot evaluate digital 'good' or 'digital' bad without having a foundation of understanding about these myriad and complex factors that make up digital, virtual and emerging technologies. Thus, a continuation of this research is needed to ensure ethical development and application of all emerging technologies in relation to children's lives.



Section 6
Who's Who

Section 6: Who's Who

Dr Eleanor Dare

Dr Eleanor Dare is a Post Doctoral Research Associate and a former Methods Fellow (2023-2024) at Cambridge Digital Humanities, University of Cambridge. Before working at CDH on the AI Forensics project, Eleanor was the Senior Teaching Associate: Educational Technologies, Arts and Creativity, and interim convenor for MPhil Arts and Creativity, lecturing and supervising MPhil and doctoral students at the Faculty of Education, University of Cambridge. Eleanor was also Head of Programme for MA Digital Direction and Reader at the Royal College of Art 2017-2020. Eleanor is an active developer of Games, critical AI, creative coding and VR content, with an MSc and PhD in Arts and Computational Technology specialising in AI and automated literature/artists' books.

Prof Steve Love

Professor Steve Love is Head of Knowledge Exchange activities in the School of Innovation and Technology at The Glasgow School of Art. This is a new school which came into existence at the start of the academic year in 2023 and was formed by the merger of the School of Simulation and Visualisation and the Innovation School at The Glasgow School of Art. His primary research expertise is investigating the impact of digital applications and services on people's behaviour and lives. His research work has been sponsored by funders such as the AHRC, EPSRC, ESRC, Innovate UK, Scottish Funding Council, European Space Agency, the European Social Fund, BT, Orange, Sharp Laboratories Europe and "3". He is a member of the Arts and Humanities Research Council's Peer Review College and a Fellow of the Design Research Society.

Angus Main

Angus is Senior Tutor (Research) at the Royal College of Art, School of Communication, where he teaches on the MA Information Experience Design and MFA Communication programmes.

His research and teaching focuses on people's experiences of technology. In particular, he critically investigates how people and AI systems perceive each other. He led an EPSRC-funded project called Countermeasures, which investigated public understanding of the sensing abilities of smart devices, with a particular focus on how to create better knowledge and agency amongst children about the ways they are observed by digital devices.

Angus is currently completing a PhD at the University of the Arts London, Creative Computing Institute, titled "Design Approaches to Creativity Support with Emended Artificial Intelligence", looking at the impact of AI on the creative practices of designers.

Richard Nash

Richard is Senior Tutor (Research) and Co-Founder of the Artists' Publishing Research Group at the Royal College of Art. Richard has an MA in Graphic Design and approaching three decades as a creative practitioner. He has extensive experience in collaborative practices through teaching on multidisciplinary art and design programmes.

As a designer, artist and publisher, Richard's creative practice is rooted in the artists' book as a primary medium and form of radical publishing. Experimental and collaborative in approach, his artists' books and publications are often centred on the book as research method, combining traditional bookmaking craft with design and technology. Richard's book works take a range of forms from animation to 3D sculptural objects. Poetic statements, visual wordplay and textual marks form a visual language and anchorage through his works, artists' books and publications.

Prof John Potter

John Potter is Professor of Media in Education at University College London at the IOE, UCL's Faculty of Education & Society. His research, teaching and publications are in the fields of participatory research, new literacies, media education, and play on and offscreen. He is the director of the UCL ReMAP Centre (Researching Media, Arts and Play), a research collaborative based in the Department of Culture, Communication and Media at the UCL Knowledge Lab, and at UCL East. He is co-editor of the journal 'Learning, Media and Technology'. John uses collaborative mixed methods in his research and has conducted many projects with children and young people exploring their lived experience of media, technology and popular culture. Previously, John worked as a primary school teacher in East London, as a teacher educator and as a local authority advisor. John most recent project as Principal investigator was leading the Play Observatory, an exploration of children's play during the pandemic, funded in the UK by ESRC.

Prof Dylan Yamada-Rice

Dylan Yamada-Rice is Professor of Immersive Storytelling at the University of Plymouth where she leads a new Future Screens initiative and is Head of MA Experience Design. She is a researcher and artist specialising in play and storytelling for children. Having a doctorate in Education and MA degrees in Research Methods, Early Childhood Education and Japanese Semiotics her work crosses academia and industry.

Her research sits at the intersection of experimental design and social sciences, focusing on digital storytelling, games and play on a range of platforms such as apps, augmented and virtual reality, as well as new content for television, all with an emphasis on media for children. As an artist she uses drawing, emerging technologies and game engines to explore experimental visual and multimodal methods as part of the research process.

Section 7
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Section 7: References

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