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University of Southampton

Faculty of Social Sciences

Southampton Education School

Reimagining co-production as playful learning: A new perspective on autistic students' experiences of participatory design and digital storytelling

by

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Thesis for the degree of Doctor of Philosophy

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Abstract

Faculty of Social Sciences

Southampton Education School

Doctor of Philosophy

Reimagining co-production as playful learning: A new perspective on autistic students' experiences of participatory design and digital storytelling

by

Verity Charlie Stone Ward

The views and perspectives of autistic children and young people are often downplayed or dismissed in both research and educational practice due to barriers created by deficit-focused conceptualisations of autism. Solutions are needed to address the lack of opportunities which autistic students are afforded to contribute their views and perspectives. Digital stories are short, student-centred videos, which can capture autistic children's educational experiences and identities by focusing on their strengths and agency. This thesis conceptualises the creation of digital stories as a form of co-production, investigating how digital stories could be used as a method to explore autistic students' experiences of participatory design, and the process of co-creating digital stories to support educational transitions. This thesis consists of two participatory action research studies conducted with students from Fairmead School, a special school in England for autistic students and students with mild to moderate learning disabilities. The research questions addressed were:

1) What insights can digital stories provide into autistic students' educational experiences of participatory design?

2) How can co-creating digital stories with autistic students provide opportunities for agency, learning and collaboration in schools?

The first study focused on students' experiences of participatory design in a weekly coding club between November 2020 and January 2022. Fourteen key stage four (KS4) students worked with school staff and technology professionals to design, develop and evaluate a computer game. The students made digital stories about their experiences, and co-produced evaluative interviews. The second study engaged another group of KS4 students to co-create digital stories, which were intended to support students transitioning to a new school building. Students worked together over seven weeks to co-create digital stories about their school, and afterwards engaged in reflective evaluation activities and interviews. The research employed a social semiotic multimodal approach to analysis, which valued the many and varied ways which students contributed to each of the projects.

Both studies add to growing evidence for the use of creative, participatory, and multimodal methods by demonstrating the utility of digital stories as a flexible method for representing students' views and perspectives. Findings emphasised the centrality of fun to students' experiences, while also recognising the entanglement between students' experiences of fun, agency, collaboration, and learning. To address the limitations of adult-centred accounts of co-production and reflect the potential of co-production as an educational experience, this thesis reconceptualises students' experiences of co-production as playful learning.

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List of Accompanying Materials

The dataset for 'Exploring experiences of autistic children in participatory design through digital stories' is available from: https://doi.org/10.5258/SOTON/D2918

The dataset for 'Extending transition support with digital stories for a new school building' is available from: https://doi.org/10.5258/SOTON/D2917

Research Thesis: Declaration of Authorship

Print name: Verity Charlie Stone Ward

Title of thesis: Reimagining co-production as playful learning: A new perspective on autistic students' experiences of participatory design and digital storytelling

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. Parts of this work have been published as:-

Ward, V. *et al*. (2022) 'Co-creation of Research and Design During a Coding Club With Autistic Students Using Multimodal Participatory Methods and Analysis', Frontiers in Education, 7(May), pp. 1–17. Available at: https://doi.org/10.3389/feduc.2022.864362.

Further details of the contributions of each of the authors to this paper can be found in Appendix A.1

Signature: ..... Date:.....

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Definitions and Abbreviations

ACoRNS..... Autism Community Research Network @ Southampton

ADHD ..... Attention-Deficit/Hyperactivity Disorder

DSM-5 ..... Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

DT..... Design and Technology

EHCP..... Education, Heath and Care Plans

ESRC ..... Economic and Social Research Council

fMRI..... Functional Magnetic Resonance Imaging

HCI..... Human Computer Interaction

ICD-11 ..... International Classification of Diseases 11th Edition

KS4..... Key Stage Four: the final stage of secondary education in England during which students work towards national qualifications such as GCSEs (UK Government, 2022d)

OFSTED ..... Office for Standards in Education, Children's Services and Skills

SEND..... Special Educational Needs and Disabilities

UNCRC..... United Nations Convention on the Rights of the Child

Part One Establishing the map

1 Introduction

The metaphor of a journey has been used by many to describe the process of completing a PhD (Amran and Ibrahim, 2012; Mantai and Dowling, 2015; Stanley, 2015). This choice of metaphor reflects the uncertainty, challenges, learning and transformational development which PhD candidates experience along the way (Miller and Brimicombe, 2004). As someone undertaking PhD research over the last few years, the COVID-19 pandemic has greatly changed the trajectory of my research. Lockdowns, nationwide school closures, and guidelines limiting face-to-face interaction have meant my research plans have needed to adapt and transform. It has taken time for me to make sense of these changes and their implications for the overarching narrative of this thesis, and in doing so I have needed to move away from more traditional thesis structures. In order to guide readers through the structure of my thesis, I have provided a visual map, which is presented for the first time here in Figure 1-1.

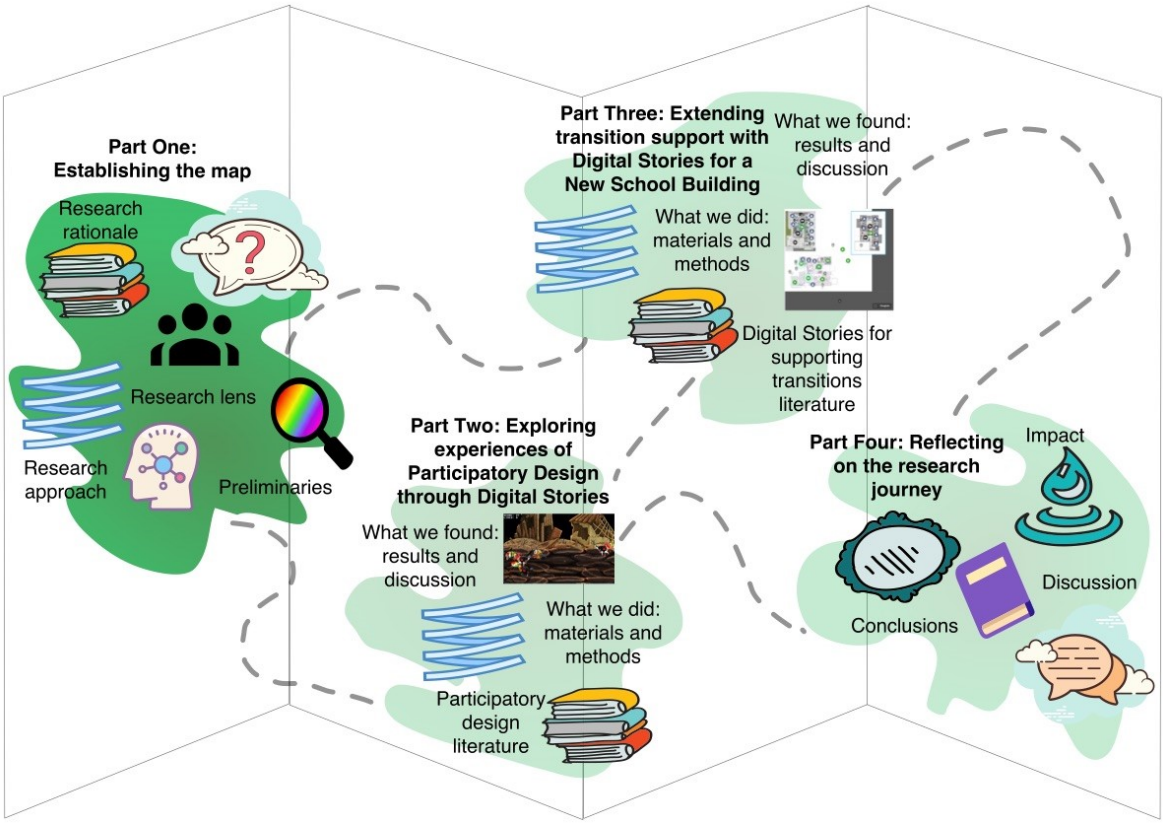


Figure 1-1: Visual map of the thesis

As shown in Figure 1-1, my thesis consists of four parts. Part One presents the background to my research, setting out the relationships, ideas, concepts, and theories which underpin my research approach, and the rationale for each of my studies. Part Two describes my first empirical study, which investigated the experiences of a group of autistic young people who engaged in participatory design to develop a computer game. Part Three describes my second empirical study, which explored how autistic young people could co-create digital stories about their school to support others transitioning (back) to school, and a new school building. Finally, Part Four reflects upon what can be learned from drawing these two studies together, and the wider impact and conclusions from my Doctoral research. The map will be repeated at the beginning of each part to position the reader within the thesis and provide a visual guide through my admittedly squiggly research journey.

2 Preliminaries

This section will set out my use of language and terminology, describing and justifying my use of identity-first language, and setting it within the neurodiversity paradigm. Within this context, I will explain my strengths-based approach, and how it sits in opposition to medicalised deficit-focused notions of autism. Thereafter, I will explain the context of my research through a brief introduction to me and to Fairmead School, who collaborated with me on both studies.

2.1 Language and terminology

Autism is defined by both DSM-5 (American Psychiatric Association, 2013) and ICD-11 (World Health Organization, 2018) in terms of deficits in social interaction and communication, and restrictive and repetitive behaviours. However, it is also important to recognise that these diagnostic criteria proliferate negative conceptualisations of autism as an illness or disease rather than as a neurological difference and a way of being (Broderick and Ne'eman, 2008). By focusing on the perceived deficits of autistic people, such definitions miss key differences which are not readily identified as impairments (Donnellan, Hill and Leary, 2012). For example, autistic people experience differences in sensory perception compared to non-autistic people (Robertson and Baron-Cohen, 2017; Kirby *et al.*, 2022; MacLennan, O'Brien and Tavassoli, 2022). Such differences have been reported by individual autistic self-advocates (Lawson, 1998; Grandin, 2006) and further evidenced through fMRI studies which show differences in neurological responses to sensory stimuli (Dinstein *et al.*, 2012; Haigh *et al.*, 2016).

Though sensory sensitivity was recognised in the most recent update of the DSM-5 (American Psychiatric Association, 2013) it was only included as a characteristic within the category of restrictive and repetitive behaviours, even though such sensory perception differences

fundamentally affect how autistic people experience the world (De Jaegher, 2013). Similarly, Murray, Lesser and Lawson (2005) argued for the recognition of attentional differences relating to autism. Autistic people are more likely to be monotropic, devoting their attention to fewer interests but more intensely, compared to non-autistic people who tend to be polytropic, distributing their attention less intensely to more interests (Murray, Lesser and Lawson, 2005; Milton, 2014; Murray, 2018).

Within medicalised conceptualisations of autism, the difficulties an autistic person faces are seen as being a direct result of their perceived impairments, rather than relating to any contextual factors at the time a difficulty is experienced. In contrast, the neurodiversity movement conceptualises autism as part of the natural variation of human neurology rather than as a disorder (Singer, 1999). Acknowledging the impact of neurological difference is extremely important when considering the experiences of autistic people, as studies have shown considerable diversity in the neurology of those sharing a diagnosis (Toal *et al.*, 2010; Lenroot and Yeung, 2013). The diversity of autistic experiences resulting from these neurological differences is reflected in the status of autism as a spectrum condition (Lai *et al.*, 2013).

Proponents of the neurodiversity movement argue for the same acceptance of autism from the neurotypical (non-neurodivergent) population as would be hoped for racial, religious, or cultural minority groups (Broderick and Ne'eman, 2008). This stance also explicitly recognises the role of society in the disabling of autistic individuals (Dalton, 2013). The role of social experiences and environments is also important in social-developmental accounts of autism which emphasise the influence of previous experiences in shaping our behaviour, how we are perceived by others, and how others respond to us, which in turn forms part of our experience which influences our subsequent behaviour (Mitchell, 2016). Within socio-developmental accounts of autism innate differences between autistic and non-autistic people are not denied, but rather understanding how autistic people are perceived by others is key to our understanding of autism (Mitchell, Sheppard and Cassidy, 2021). In recognition of the partly interactional nature of autism as a phenomenon, Milton (2012) proposes that autism can be understood through the double empathy problem, in which autistic and non-autistic individuals struggle to understand each other's intentions resulting in marginalisation of autistic people who are the minority group within a largely neurotypical society.

Within my research, I view autism through the lens of neurodiversity to actively avoid the deficit-focused narrative of personal tragedy which is inherent in medical definitions. My approach and understanding moves responsibility for disabling experiences away from individuals and towards society, in line with social models of disability (Marks, 1997; Reindal, 2008) and socio-developmental accounts of autism (Mitchell, Sheppard and Cassidy, 2021). Accordingly, I

primarily adopt identity-first language (autistic person) in line with autistic self-advocates who use it to reflect the nature of autism as part of their identity (Brown, 2011; Sinclair, 2013). Sometimes, I may also use "person on the autism spectrum", to reflect the preferences of autistic people and their families (Kenny *et al.*, 2016). Moreover, my choice of identity-first language also avoids the ableist connotations of person-first language, which can act to further marginalise autistic people (Bottema-Beutel *et al.*, 2021; Monk, Whitehouse and Waddington, 2022). Exceptions to this wording may occur when quoting directly from other people, or if autistic individuals involved in research express a different preference. In both cases this will be clearly indicated with a footnote. Personal preference is an important exception to the general adoption of identity-first language, as the performative nature of language (Sacks, 1992) means that asserting my stance on wording despite an individual's preference could be seen as an infringement of their identity. Choosing to go against an autistic person's preferences in this respect could therefore also be seen as an instance of ableism, and a dehumanising denial of a person's agency (Bottema-Beutel *et al.*, 2021).

2.2 Research context

Although my Doctoral research was not formally associated with a wider research study, I am a member of the Autism Community Research Network @ Southampton (ACoRNS) and have engaged with and contributed to other research projects conducted through the network during my doctorate. ACoRNS is a group centred around research-practice partnerships between academics from the University of Southampton and educational settings (Parsons and Kovshoff, 2019). This model of research aims to go beyond the paradigms of knowledge transfer which places an emphasis on research sharing findings and outcomes with practice, and knowledge exchange where practice and research may be in dialogue, and share ideas, but the emphasis remains on research influencing practice rather than the other way around (Parsons et al., 2013; (Parsons, 2021). Instead, ACoRNS aims to bring together the knowledge, experience and perspectives of educational practitioners, researchers, autistic children and young people, and their families to co-construct knowledge which better reflects their priorities and lived experiences (Parsons and Kovshoff, 2019; Parsons, 2021; Parsons *et al.*, 2021). In doing so ACoRNS intends to make meaningful change by contributing to a knowledge base which both addresses and recognises the challenges faced by autistic children and young people, without reducing them to those challenges (Parsons *et al.*, 2021; Parsons, Kovshoff and Ivil, 2022).

2.2.1 Positioning myself within the research

Within the context of the collaborative models of knowledge co-construction which we practice in ACoRNS, it is important to recognise what I bring to research-practice partnerships. In terms of my academic background and professional experience, I have come to Education as a field via linguistics, modern languages, and computer science, with several years working as an artificial intelligence engineer developing text processing models for a technology start-up. This means I bring strong technology skills, and the vital openness and confidence needed to develop new ones, and to encourage others to do so too. Importantly, my meandering across and between disciplines means I am comfortable in the between-ness of interdisciplinary spaces, happy to borrow useful concepts and theories from different fields as they become relevant to my Doctoral research in Education.

Education is concerned with the process of teaching and learning, is highly complex and multifaceted and, consequently, educational research is inherently multidisciplinary (Murphy, Mufti and Kassem, 2009). For example, as the use of technology in everyday life has grown there has also been a growing interest in its use within education, in terms of its potential to transform education, and its impact on how and what students learn. Research about technology in education has drawn upon many disciplines, which might each focus on different aspects: for example, Psychology might focus on how technologies change the cognitive processes of learning (Lorenzo and Trujillo, 2018); whereas Sociology might look at how technology transforms social interactions (Selwyn and Facer, 2014); and human-computer interaction (HCI) might investigate how different interfaces affect the educational experience (Roldán-Álvarez *et al.*, 2016).

On this basis, I follow existing traditions of multi- and interdisciplinary work in education by drawing together concepts and theories from Psychology, Sociology, HCI and Linguistics. However, the key for me in my engagement with this research through ACoRNS is a focus on the perspectives of autistic students about their educational experiences. Consequently, I use this interdisciplinary perspective to try to ensure that my research includes their perspectives in an authentic and meaningful way.

2.2.2 Fairmead School

On the other side of the research-practice partnership which formed the basis for my Doctoral research is Fairmead School, which collaborated with me across both empirical studies. Fairmead School is a special school which caters for autistic students, and students with moderate learning difficulties aged 4-19 (Fairmead School, 2020). Many of the students at Fairmead School have formal autism diagnoses, which are stipulated within Education Health

and Care Plans (EHCPs), however this is not the case for all students. Furthermore, while many of the students are autistic, their attendance at Fairmead School implies a degree of similarity in terms of their educational support needs. In recognition of the diversity of experience within the autistic community, it is therefore important to remember that the experiences presented within this thesis cannot be considered representative of the autistic community as a whole.

Fairmead School is situated on the outskirts of Yeovil in the South West of England, and has a wide catchment covering the counties of Somerset and neighbouring Dorset (Fairmead School, 2020). It was rated as Good in its most recent OFSTED inspection in 2018 (UK Government, 2022b). The student population is fairly representative of a special school in the South West. 46.4% of their students qualify for free school meals (UK Government, 2022b), this is similar to the national average for state-funded special schools, which was 44.7% in the 2021/2022 academic year (UK Government, 2022c). According to the 2021/2022 January school census only 7% of students at Fairmead identify as an ethnic minority (Berryman, 2022). This reflects the lack of diversity across the South West, and in Somerset particularly, where 86.4% of students are White British (UK Government, 2022c). When I first started collaborating with Fairmead School, it was a relatively small school of 110 students (Fairmead School, 2020).

Figure 2-1: Photograph of Fairmead School as seen through Google Street View (Google, 2022)

Establishing a sense of mutual benefit was key to my early engagement with Fairmead School, and so joint goals and objectives were set together through discussions between myself and senior leaders. This was necessary to ensure that the school leaders who had a responsibility for the safety and education of the young people I wanted to work with would support and facilitate my research. Additionally, establishing a sense of mutual benefit is essential within approaches which aim to co-construct knowledge, where researchers seek to create more equitable relationships for contributing partners (Parsons and Kovshoff, 2019; Parsons, 2021; Parsons *et al.*, 2021). The choice to name Fairmead School directly, rather than use a pseudonym also reflects the focus on mutual benefit, as Fairmead School leaders wished to be

recognised for the school's considerable contributions to my Doctoral research. With respect to the aims of the first study, the project was intended to expand the opportunities for Fairmead School students to learn about computer programming, game development and careers within the technology sector. As a researcher I wanted to facilitate and explore the student's involvement in the participatory design of a computer game. Thus, the agreed project direction encompassed mutually beneficial and aligned educational and research objectives.

In contrast, the development of the second study came in response to the context of building work at Fairmead and prevailing COVID-19 restrictions. During the 2020-2021 academic year, work began on a new school building to expand capacity and replace several "temporary" huts which had been used as classrooms for several years. The new school building was completed and opened for the beginning of the 2021/2022 academic year; however the school was not given sufficient access to the building before then to complete any in-person transition activities. The new building came with a 30% increase in student numbers, from 110 to 143 children and young people (UK Government, 2022b). Consequently, the timing of building work and COVID-19 restrictions revealed an opportunity for collaboration to expand Fairmead's existing transition supports and prepare new and current students for the transition into the new school building. A fuller rationale for each study can be found in section 3 below.

3 Research rationale

Despite a gradually improving situation in terms of the public awareness of autism and the neurodiversity movement (Ahmed *et al.*, 2018; Leveto, 2018), autistic children and young people are still marginalised, experiencing barriers which effectively exclude them in many areas of their lives. Such marginalisation is intersectional being based on neurotype (Cage, Di Monaco and Newell, 2019) and age (Moran-Ellis, 2010). This intersectional marginalisation is made more complex for many by additional barriers relating to other characteristics, such as co-occurring health conditions and learning disabilities, cultural, linguistic and racial identities and socio-economic factors (Botha and Gillespie-Lynch, 2022). This marginalisation is manifested through autistic people experiencing high rates of mental illness (Gillberg *et al.*, 2016; Botha and Frost, 2020), school exclusion (Timpson, 2019), and under- or unemployment (National Autistic Society, 2016). On an individual level this means autistic people repeatedly experience feelings of exclusion and barriers to education, healthcare, occupational and social support (de Schipper *et al.*, 2016; Vincent *et al.*, 2017; Goodall and MacKenzie, 2019; Riitaoja, Helakorpi and Holm, 2019).

These experiences of exclusion have been linked to autistic people's position as a neurominority within a largely neurotypical society (Botha and Frost, 2020), which tends to

conceptualise autism in terms of deficits and stereotypes (Thibault, 2014). Due to this focus on deficits, autistic people are often dehumanised (Cage, Di Monaco and Newell, 2019), and denied agency and human rights because of their need for support and perceived lack of independence (Sarrett, 2012) within inflexible ableist systems. Furthermore, autistic people have historically faced further exclusion from research (Milton and Bracher, 2013; Botha, 2021) which might otherwise counter such dehumanising and detrimental narratives about autism (Catala, Faucher and Poirier, 2021; Rosqvist *et al.*, 2022). Within educational research contexts, there remains a considerable gap between research and practice (Parsons and Kasari, 2013; Parsons *et al.*, 2013; Parsons, 2021). Furthermore, autism research often employs inflexible methods which are centred around neurotypical adult expectations and priorities (Parsons *et al.*, 2019) that effectively exclude the voices of autistic children and young people. Through my research I aim to address some of these issues, by demonstrating the value of co-production through co-creation of digital stories and exploring their potential to give insights into the educational experiences and agency of autistic children.

3.1 Why digital stories?

Digital stories are short videos of typically 2-5 minutes, which combine different forms of media including video footage, still images, sounds, narration and music to convey the views and experiences of the author (Lambert, 2009). Though it has taken some time for the opportunities of digital storytelling to be applied to educational autism research (Parsons, Guldberg, *et al.*, 2015), the term digital storytelling was coined and developed by Dana Atchley and Joe Lambert through the Center for digital storytelling in USA (McLellan, 2006; Lambert, 2010). This tradition of digital storytelling was centred in the arts, drawing on oral storytelling traditions from African and Jewish cultures (Lambert, 2010). Within this context, the emphasis was on the creation and development of personal narratives which formed an authentic representation of the author's voice through reflection on their emotional connection to the story (Lambert, 2010). Some have continued directly with this idea, implementing digital storytelling as a method to access personal stories and authentic accounts of overcoming adversity and developing identities (Johnson and Kendrick, 2017; Ellem, Harris and Strnadová, 2022). However, other work has focused on the digital and technical aspects of digital storytelling (Campbell, 2020; Gürsoy, 2021) and the opportunities they provide to communicate meaning through different media (i.e., text, photographs, music, speech, footage etc) (Lewis Ellison, 2017; Merjovaara *et al.*, 2020; Undheim, 2020; Kim, Yatsu and Li, 2021).

Digital stories have been used across a range of disciplines, including healthcare (Gubrium, Hill and Flicker, 2014; De Vecchi *et al.*, 2016), social work (Chan and Sage, 2021) and education (Wu

and Chen, 2020), usually to access and centre the views of those whose perspectives are missing from dominant narratives and discourses (de Jager *et al.*, 2017). Within the context of autism research, Parsons *et al*. (2015) argued that digital stories can be a way for unheard voices to be heard by capturing their perspectives within collaborative filming, editing and narrative creation. Through the creation of digital stories, autistic children can communicate their own experience and knowledge, as their choice of what to film and what footage to include in stories make explicit their own priorities and sense-making practices (Parsons, Guldberg, *et al.*, 2015). Furthermore, the flexibility of digital stories as a method of communication creates opportunities to avoid normative ways of presenting information such as language. Filming allows individuals to capture audio-visual data which is literally from their perspective when they hold or wear the camera, depicting skills and experiences which might not easily be conveyed through words. In this way digital stories can potentially avoid the privileging of neurotypical adult researchers' perspectives, which more traditional methods of data collection can reinforce.

Importantly, the flexibility of creating digital stories means autistic young people can choose to engage in ways which best suit them, with help and support provided when requested or required. Moreover, the process of creating digital stories might provide opportunities for autistic young people to build on existing strengths such as creativity and digital skills (Warren *et al.*, 2021), as has been suggested in studies with young children in early years contexts (Merjovaara *et al.*, 2020). As a flexible and strengths-based approach, I hoped that creating digital stories would enable autistic young people's skills and agency to challenge deficit-focused research and generate new narratives about their educational experiences more grounded in their own perspectives.

3.2 Digital storytelling as co-production

Educational researchers identified the role which digital stories could have in the co-construction of knowledge about autistic children and their educational experiences (Parsons, Guldberg, *et al.*, 2015; Guldberg *et al.*, 2017). However, it is only more recently that some have begun to consider digital story creation as a form of co-production (Heron and Steckley, 2020; Harris *et al.*, 2022). As a term, co-production is being used increasingly within both policy and research (Needham *et al.*, 2012; Beebeejaun *et al.*, 2015). However, a clear unified definition of the activities that co-production entails is difficult, due to its use as an overarching framework which encapsulates different methods from a range of disciplines and traditions (Facer and Enright, 2016). Instead, a more abstract or conceptual definition is needed to unify the approaches commonly associated with co-production. Bell and Pahl (2018) provide such a

stance, as they position co-production as a utopian approach which employs values-based collaborative activities and contributes towards social justice aims; in other words, it is (or rather aims to be) a transformational process through which people work together to enact shared values to make the world more equitable.

Though the nature and structure of activities and methods may vary, there is a strong sense of collective action within co-production; from the perspectives of the non-academic communities, being involved might be described as "doing with", rather than "doing for" or "doing to" (den Houting *et al.*, 2021, p. 149). This necessitates a disruption of the usual knowledge hierarchies which position academics as experts, and practitioners and those with lived experience as somehow lesser (Nind, 2014b; Barke, Thomas-Hughes and Howard, 2020). Instead, co-production aims to redistribute power to address the systematic devaluation of lived professional and practical experiences (Facer and Enright, 2016). Through promoting the knowledge of those who have otherwise been left out of research, co-production aims to use the tools of academic research to work against marginalising and oppressive discourses and dynamics and imagine what might be possible if this more equitable approach was extended beyond the sphere of co-production (Bell and Pahl, 2018). Consequently, co-production can be seen as a process of collaborative action, which affords greater agency to non-academic partners in research, valuing their expertise through collective learning, and knowledge co-construction.

Similarly, digital stories are often created collaboratively and aim to represent lived and professional experiences, which are often missing from research. Digital storytelling has been used in autism research to interrupt traditional hierarchies of knowledge, by recognising and combining the expertise of autistic children, their families, and educational practitioners to enable richer understanding of autistic students' educational experiences (Parsons *et al.*, 2021). As such, I conceptualise the creation of digital stories as a form of co-production, which offers opportunities for agency, collaboration, and learning; more details of what I mean by each of these terms can be found below in section 4.2. This conceptualisation of digital storytelling as a form of co-production follows work by Harris *et al*. (2022), and Heron and Steckly (2020) who considered the co-creation of digital stories with a self-advocacy group for people with intellectual disabilities, and with vulnerable young people, respectively.

3.3 Research questions

Within this context, I consider digital story co-creation as a means of co-constructing new knowledge. My first study addresses how digital stories can be used to explore autistic young people's experiences of participatory design, which is considered as both an educational

experience and a form of co-production. The intention of this study was to contrast much of the existing participatory design literature, which tends to focus on the outcomes of design rather than the process of design creation. This study aimed to answer my first research question:

1. What insights can digital stories provide into autistic students' educational experiences of participatory design?

My second study interrogates the process of digital story creation as a form of co-production, addressing how the core elements of co-production (namely agency, collaboration, and learning) were manifested through a project to develop digital stories about Fairmead School and their new school building. This study aimed to answer my second research question:

2. How can co-creation of digital stories provide opportunities for agency, collaboration and learning for and with autistic students?

The following sections give more details about the rationale for each study. To ensure that the scope of findings and claims across the studies are clear, the term *co-production* is reserved for use when referring to the overarching concept explored in section 3.2. Although others have viewed co-creation as an umbrella term to refer to any form of shared creative process and co-design to refer more specifically to shared design endeavours (Sanders and Stappers, 2008), within this thesis I adopt a slightly different usage for clarity of meaning across the studies. I use *participatory design* (or occasionally *co-design*) to refer to the process of collaborative design explored in the first study, and *co-creation* to refer to the collaborative development of digital stories employed as method in the first study and focus in the second study. The term *co-construction* is used exclusively in reference to the generation of new knowledge, in line with the context of the research within a research-practice partnership and the epistemological position outlined in section 4.1.

3.4 Rationale for the first study: exploring experiences of participatory design through digital stories

The aim of the first study was to investigate autistic young people's experiences of participatory design using digital stories. The study engaged fourteen students from Fairmead School in the participatory design of a computer game, during an extra-curricular activity session which we referred to as "coding club". The students took turns to film the sessions, and the footage was used by individuals and small groups of students to create digital stories about their experiences. Further details about this study can be found in Part Two. This section sets out the rationale for this study, positioning participatory design as both a form of co-production, and an

educational experience, and explaining how digital stories provided more student-centred accounts of their experiences.

3.4.1 Positioning participatory design as a form of co-production

Like co-production, participatory design is not easily defined by a characterisation of methods, formulas and rules, however participatory design broadly requires "directly involving people in the co-design of the artefact, processes and environments that shape their lives" (Robertson and Simonsen, 2013, p. 2). This definition reflects the importance of users to participatory design where users are defined as the people who apply or interact with the solutions created through participatory design (Bødker, Kensing and Simonsen, 2011; Robertson and Simonsen, 2013). In turn, designers facilitate and oversee the progress of participatory design (Bødker, Kensing and Simonsen, 2011); they are responsible for both the product that is designed and the process which empowers other participants to contribute to designs (Robertson and Simonsen, 2013). Some participatory design also aims to include other stakeholders, engaging with people who have both direct and indirect experience of the issues and processes which participatory design aims to address (Martin, Mariani and Rouncefield, 2008; Vink, Imada and Zink, 2008).

This definition recognises three different perspectives which influence the progression of participatory design: designers, users, and other stakeholders, such as those who are indirectly affected by potential solutions, commissioning designs, or who have responsibility for users. Good participatory design must balance and embrace the multiple perspectives of those involved in a project, whether they be users, designers, or other stakeholders (Bratteteig and Wagner, 2016). To equitably balance these multiple perspectives, and to ensure that marginalised voices are represented, participatory design typically involves iterative development cycles through which design is incrementally developed, reviewed, and evaluated (Sanoff, 2010; Robertson and Simonsen, 2012).

In participatory design, iterative development has been interpreted in several ways. Bjögvinsson, Ehn and Hillgren (2012) described how iterative development allows ideas to incrementally become more concrete, with each representation acting as a commonality across the differing communication styles and perspectives of those involved. Conversely, Bratteteig and Wagner (2016) positioned the iterative nature of participatory design as a means of incrementally exploring both the design problem, and its solution, through the cyclical process of informed decision making and evaluation. Similarly, Robertson and Simonsen (2012) argued that the iterative nature of design is a way of gaining greater understanding of how resulting designs might work in context from the user's perspective. In all these interpretations of iterative development the understanding of the problem and design decisions develop

gradually, with reflection at each iteration to evaluate whether progress adequately captures the multiple perspectives.

For Sanoff (2010), iterative design, development and evaluation was the only way that democratic consensus could be reached in design. However, the power imbalances which frequently exist between various stakeholder groups means a democratic consensus is often difficult to achieve (Björgvinsson, Ehn and Hillgren, 2010). A critical awareness of the context of participatory design is therefore also necessary to facilitate the participation of the most marginalised groups (Kinnula and Iivari, 2021). As a process which aims to disrupt traditional power structures and centre the views of those who are often neglected to create solutions which better suit user's needs, participatory design is one of the many processes of values-based collaborative action that can be included under the umbrella of co-production (Facer and Enright, 2016).

3.4.2 Centrality of learning within participatory design

The involvement of users and other stakeholders throughout the design process acts to capture their knowledge, experience, and interests within designs (Kensing and Blomberg, 1998). Participatory design can therefore be seen as the result of knowledge contributions from users, stakeholders and designers in a way which facilitates them learning from each other's expertise. This process is often described as mutual learning, and it has been described as a key goal of participatory design (Robertson and Simonsen, 2012). In fact, it could be argued that mutual learning is an essential part of the participatory design process, whereby the development of participants' competence, agency, and knowledge, primarily through the process of mutual learning is a core tenet of genuine participation (Chawla and Heft, 2002; Greenbaum and Loi, 2012; Kinnula and Iivari, 2021). For example, in the context of technology design, users must learn a considerable amount about technology, and designers must learn and understand users' lives to envisage and develop possible technological futures together (Bratteteig, 1997; Robertson *et al.*, 2014). As such, participatory design can be defined as the process of designing *with*, and not merely *for*, the users and stakeholders of the resulting design object.

Consequently, mutual learning is an important goal and outcome of participation within participatory design (Robertson and Simonsen, 2012). For some, the process of mutual learning is key to imagining new technological possibilities grounded in real-life contexts (Bratteteig, 1997; Robertson *et al.*, 2014). Despite many agreeing on the centrality of mutual learning to participatory design, there is disagreement about when and how it should occur. For some, such as Bratteteig (1997), mutual learning is a distinct stage of participatory design which should be conducted before any solutions are developed. For others, it is an embedded process

which occurs incrementally through ongoing reflection during the design process (Robertson *et al.*, 2014). Similarly, questions remain about what knowledge can be created through mutual learning. For Robertson *et al*. (2014), mutual learning is limited and structured, focusing on the design problem under investigation. However, Robertson *et al*. (2014) do not account for other exchanges of skill and knowledge between participants. For example, by bringing together groups of people who may not otherwise meet, participatory design potentially provides an opportunity for the development of skills which support such collaborations and learning more holistically about each other. Within the field of autism research, this idea has been referred to as "interactional expertise" (Milton, 2014, p. 794) i.e., the knowledge and understanding of the lived experiences of autism that can only be accrued through sustained and meaningful interactions with autistic people.

This more holistic interpretation of learning within participatory design is dependent on the same prerequisites as more restricted definitions. For example, if participants are not open or willing to learn then it is unlikely that they will do so (Bratteteig, 1997). Similarly, if participants do not respect each other and recognise the validity of others' expertise then mutual learning is not likely to occur (Bratteteig, 1997). This idea of mutual respect is supported by Fowles (2000) who discussed the need to recognise not only the expertise of each group of stakeholders participating in the design process, but also their areas of ignorance through a process which he termed "symmetry of knowledge" (Fowles, 2000, p. 63). By understanding what each group does not know, groups can work together to build each other's knowledge, and marginalised groups can recognise the value of their own expertise. This recognition of knowledge within themselves, and by other people, can be an empowering process, as it enables people to assume the power associated with the knowledge which results from their lived experiences (Bratteteig and Wagner, 2012). However, even when the knowledge of different groups is recognised, they must have access to a shared, common language free from technical or professional jargon to communicate this expertise effectively with one another (Fowles, 2000).

Shared language, spaces, and practices can form part of what Muller and Druin (2012, p. 1129) term "third spaces" within participatory design. These are spaces which belong neither to the users, nor the researchers/designers, and which are unique to participatory design. They are common spaces where different stakeholders in a project come together to learn, design, and create (Makhaeva, Frauenberger and Spiel, 2016). This idea is supported by Clement and Van den Besselaar (1993) who recognised the importance of having designated time and space for participatory design projects away from everyday demands. These spaces can be literal (i.e., neither researcher's labs nor users' workplaces) or metaphorical i.e. developed through shared practices which foster a sense of community through shared experiences of respective familiarity and uncertainty (Muller and Druin, 2012; Makhaeva, Frauenberger and Spiel, 2016).

By engaging in these spaces, where participants experience the tensions and conflicts between the familiar and the unfamiliar, participants may come to reflect upon and re-examine their own worlds. Reflection is a key tool for the articulation of the changes in perspective recognised as learning (Bell and Davis, 2016). Through self-reflection, participants are more open to others' observations which can change and deepen participants' understanding further. Activities which encourage this duality of familiarity and uncertainty, such as collaborative design activities, including high and low-tech prototyping, and documenting ongoing activities, can therefore be considered key to such self-reflective mutual learning (Muller and Druin, 2012).

For Béguin (2003), mutual learning is not just an outcome of participatory design. Instead he conceptualised the whole design process as one of mutual learning, where designs are created through iterative projection of knowledge into intermediary forms, such as storyboards and prototypes, and reflection upon the application of knowledge within those forms (Béguin, 2003). Within the participatory design context, both designers and users collaboratively contribute knowledge which is manifested in the resulting designs: designers contribute their professional knowledge through design development, and users contribute knowledge of their lived experiences through design critique and testing (Béguin, 2003). Furthermore, activities such as design critique and testing can allow users to contribute in ways which do not rely on direct verbal expressions of knowledge. For example, Druin (2002) highlights the opportunities for children to contribute to designs through analysis of their behaviour as they interact with prototypes. By accepting such critical engagement with designs as a potential way of contributing knowledge, the design artefact becomes a mediator of both users' and designers' knowledge, and new co-constructed meaning, which is situated within shared, collaborative experiences (Harrison et al., 2011).

In relation to the literature concerning participatory design with children, the learning potential of collaborative design approaches was recognised both within Druin's (1999) cooperative enquiry approach and within learner-centred design (Good and Robertson, 2006). While learner-centred design focuses primarily on the child as a potential learner (Good and Robertson, 2006), cooperative enquiry accounts for the learning of both adults and children through what Druin (1999) termed 'design-centred learning'. During the development of two pieces of software to support storytelling she asked intergenerational design teams consisting of academics from education, robotics and art, and children aged 7-11 years old to self-report learning using post-it notes (Druin, 1999). Druin's (1999) analysis identified five key areas of learning: (1) the design process, (2) other designers and their knowledge, (3) communication and team working, (4) new technology skills and (5) the topics included as game content. For example, Druin (1999) described knowledge about animals as an outcome of one project which designed robotic animals to facilitate storytelling. I follow Druin (1999) in recognising the potential of

participatory design as a learning activity for adults as well as children, and in adopting an open, holistic view of what may be learned through participatory design.

Rather than examine learning through retrospective reflection, Bell and Davis (2016) sought to document and explore mutual learning more directly as it happened. They explored the relationship between participation and learning within participatory design for teenagers involved in designing a digital badge to support learning in an after-school science program. Bell and Davis (2016) viewed participation and learning as reciprocal processes, where reflection about one led to greater insight about the other. They used data from a range of sources: video and audio recordings of sessions, researcher notes, and output from design workshops to identify critical learning moments and their associated learning outcomes. However, while their analysis focused principally on students' learning, their data collection methods and analysis focused on adult perspectives, where researcher summaries were the main tool for identifying learning moments. In doing so, Bell and Davis (2016) also ignored what adult participants, in the form of program supervisors and researchers, might have learned through being involved. Furthermore, as their study only documented early ideation stages of participatory design, they also missed key insights from the collaboration between teenagers and designers directly. This example demonstrates how the learning which can occur about other participants in design is an area which can be ignored within conceptualisations of participatory design. It is therefore something which I focus on within my own work.

3.4.3 Relevance of participatory design to autistic young people

Although participatory design methods have been applied in several areas where democratisation of design was needed (Sanoff, 2010), the history of participatory design is firmly rooted within the design of technology. Participatory design was first pioneered in Scandinavia as part of the workplace democracy movement in the 1960s and 70s (Floyd *et al.*, 1989), sparked by concerns that increasing use of technology in the workplace would reinforce existing power imbalances between managers and workers (Kyng and Mathiassen, 1982; Kensing and Blomberg, 1998; Robertson and Simonsen, 2012).

Since then, participatory design has been used to develop a range of technologies, including technologies for educational purposes, in particular programming languages for children (Papert, 1977; Goldberg, 1984). Participatory technology design has also expanded beyond a focus on purely educational tools, towards technologies which support children's development more generally, through assistive technologies, technological tools for exploration, specific technological therapeutic interventions, and technologies for entertainment (Benton and Johnson, 2015). Furthermore, the focus on technology for educational purposes has not been

limited to the classroom; for example, there has also been considerable work in participatory technology design for the development of educational experiences in museum contexts (Dindler *et al.*, 2010; Bossen, Dindler and Iversen, 2012).

In early research about autism and technology, researchers were quick to recognise the potential relevance and appeal of computers to autistic people (Colby, 1973; Panyan, 1984; Swettenham, 1996). Much of the research in this area has focused on the design, development, and efficacy of autism-specific technologies (Parsons *et al.*, 2019). However, as in technology design for children more widely (Druin, 2002), early research and development of such technologies was centred on autistic children as the passive users of technology, who only became involved at the late stage of testing the efficacy of technological interventions (Colby, 1973; Swettenham, 1996; Silver and Oakes, 2001 for example).

Though the inclusion of children in technology design has increased in the last 30 years (Druin, 2002; Benton *et al.*, 2014; Malinverni *et al.*, 2014; Schepers, Dreessen and Zaman, 2018b), it has taken a little longer for researchers developing technologies for autistic children to make increased efforts to include their perspectives in the design process (for example Keay-Bright, 2007; Woodcock and Georgiou, 2008; Frauenberger et al., 2011; Parsons, 2015 among others). This delay in including autistic children might reflect deficit-focused conceptualisations of autism which are also shown through a continuing focus on developing technologies aimed at reducing the perceived deficits associated with autism (Woodcock and Georgiou, 2008), such as social and communication difficulties (Kientz *et al.*, 2013). Nevertheless, more recent research shows evidence for the adoption of more holistic and strengths-based approaches within some technology design research with autistic children and young people (Spiel, Frauenberger and Fitzpatrick, 2017; Frauenberger, Spiel and Makhaeva, 2019), including a more critical interrogation of their role within existing research (Spiel *et al.*, 2019; Spiel and Gerling, 2021) and analyses which offer more ethical alternatives (Spiel *et al.*, 2020).

Despite this, the focus of participatory design research has largely been on the technologies resulting from participatory design (outputs), rather than the processes of including autistic children and young people in participatory design (Parsons and Cobb, 2014). Therefore, as a way of helping to move research forward in this area, my research examined autistic young people's experiences of a participatory design process, from their own perspectives, by engaging in research which respects and values their different ways of knowing about the world.

3.4.4 Examining participatory design experiences through digital stories

Digital stories offered a potential solution to the issue of giving insights into autistic students' experiences of participatory design in a way which reduces the privileging of neurotypical adult

priorities and expectations. As a strengths-based approach, which actively embraces the many ways which people can represent meaning (Parsons, Guldberg, *et al.*, 2015), the creation of digital stories was intended to allow students to create their own narratives about their experiences of participatory design in a way which reflected their priorities and experiences. This use of digital stories to examine educational experiences follows earlier work with autistic children to capture their experiences with educational technologies (Parsons, Guldberg, *et al.*, 2015; Guldberg *et al.*, 2017). However, it represents a novel approach to examination of the process of participatory design, and therefore an extension of the method to a previously unexplored process.

3.5 Rationale for the second study: extending transition support through digital stories for a new school building

The purpose of the second study was to explore the process of creating digital stories as a standalone form of co-production, rather than as a means for documenting and sharing experiences of participation as in the first study. The second study involved a total of sixteen students, who contributed to the creation and evaluation of a set of digital stories about Fairmead School to supplement their existing support for new and current students transitioning to the school and the new school building in September 2021. During their "Accessing the community" life-skills lessons, students worked together to plan the topics for their digital stories, mapped what they wanted to include, filmed their digital story content, described it and edited the footage and descriptions together. A full description of this study is in Part Three. The following section sets out the rationale for co-creating digital stories as a support for transitioning to the new school building, and the need for exploring young people's participation in the creation of the digital stories as a process rather than an outcome.

3.5.1 Challenges of transitions for autistic students

It is widely established that educational transitions, including transitions to new schools, can be stressful for all children (Cauley and Jovanovich, 2006; Cairns and Harsh, 2014). The stress and instability which children and young people experience upon transitioning to a new school can even manifest in drops in attainment (West, Sweeting and Young, 2010; Ng-Knight *et al.*, 2019), and issues with sleep (Cairns and Harsh, 2014). Furthermore, there is evidence to suggest that autistic children may find transitions more stressful than their neurotypical peers, perhaps due to higher anxiety in response to uncertainty (Boulter *et al.*, 2014) and the prevalence of preferences for similarity (Cuccaro *et al.*, 2003). This discomfort with transitions for autistic children appears to be experienced for both the smaller, everyday transitions between spaces

and activities, known as horizontal transitions (Adreon and Stella, 2001), and larger, less frequent transitions such as those between year groups or schools, known as vertical transitions (Mandy *et al.*, 2016; Makin, Hill and Pellicano, 2017). Indeed, Fontil *et al*. (2020) noted that autistic children seem to experience difficulties with smaller transitions than their peers with other developmental differences, which is often exacerbated by a lack of autism-specific knowledge about transition supports.

Autistic children can experience particular issues related to their neurodivergence upon transitioning to a new setting, which means they may experience the new setting as disabling. New educational settings often entail new people to form relationships with; and other students and staff may not have the interactional expertise to effectively do this with new autistic students, meaning that they struggle in the new setting (Nuske *et al.*, 2019). Similarly, a new physical environment can mean unexpected sensory experiences, uncertainty around routines, and tacit social rules which autistic children may need support to negotiate (Nuske *et al.*, 2019). Furthermore, insufficient support for autistic students transitioning to new settings can lead to reduced academic performance, and anxiety for children, their parents, and other key stakeholders (Jindal-Snape *et al.*, 2006). In particular, the changes relating to disrupted friendships and uncertainty around arranging accommodations and supports can be particularly worrisome (Richter, Popa-Roch and Clément, 2019).

Effective transition planning and support should be focused on familiarisation between autistic students and their new education provider (Hoy, Parsons and Kovshoff, 2018), so that children experience less uncertainty about the new environment, and new staff can build the vital interactional expertise required to anticipate and provide relevant support to the new child and their family. In early school transitions, this often means a family-centred approach to transitions (Fontil *et al.*, 2020), whereas for later transitions to secondary or post-16 provision the focus shifts to more person-centred approaches (Hatfield *et al.*, 2018; Hoy, Parsons and Kovshoff, 2018). This shift in approach perhaps reflects the extent to which autistic children and young people are considered as autonomous within the context of their education, where the key to successfully facilitating transitions to new settings is primarily dependent on the quality of relationships fostered between stakeholders in their education during the transition planning process (Deacy, Jennings and O'Halloran, 2015).

3.5.2 Transitions in the context of COVID-19

Research into the mental health of autistic children and young people during the early stages of the COVID-19 pandemic (March to October 2022) suggests that many experienced symptoms of anxiety and depression related to the disruption of their normal routines and support networks,

and ongoing uncertainty about how and when they would be returning to normal (Toseeb and Asbury, 2022; Asbury and Toseeb, 2023). While lockdowns reduced the demands placed upon many autistic students to attend school, the return to school was accompanied by high levels of anxiety for many autistic children and young people (Toseeb and Asbury, 2022). For many students (including those on the autism spectrum), the transition back to in-person schooling in September 2020 also involved a vertical transition into a new educational setting (Code *et al.*, 2022). However, government guidelines restricted in-person visits to school, and required wearing masks and social distancing where these were allowed (Hallahan, 2021). These restrictions persisted throughout the 2020-2021 academic year meaning that vertical transitions into new year groups and school settings in September 2021 were also affected, resulting in changes to transition support (Hallahan, 2021).

Prior to the introduction of COVID-19 restrictions, visiting a new school setting was an incredibly common activity used to prepare and support autistic students with vertical transitions (Nuske *et al.*, 2019). Such transition visits were intended to support students with sensory experiences which would otherwise be difficult to anticipate, and to provide them with knowledge about how to navigate their new school or building (Richter, Popa-Roch and Clément, 2019). For many autistic students, the lack of opportunity to visit new schools due to COVID-19 restrictions negatively impacted their experience of vertical transitions (Code *et al.*, 2022). This lack of coordinated in-person visits also minimised the potential for autistic students to strengthen existing friendships or create new ones. This is problematic as friendships and other relationships with peers have been recognised as an important protective factor in supporting autistic students' experiences of transition (Makin, Hill and Pellicano, 2017), especially within the context of the pandemic and restrictions on movement and social contact (Fox *et al.*, 2022).

Similarly, COVID-19 restrictions also limited the extent to which students and staff could engage in pre-transition meetings, which were another common tool used to support autistic students during vertical transitions before the pandemic (Nuske *et al.*, 2019). Furthermore, the restriction on face-to-face meetings and visits affected wider stakeholders in the transition process, meaning parents missed otherwise vital opportunities to build relationships and trust in new education providers (Richter, Popa-Roch and Clément, 2019). Overall, this resulted in limited opportunities for collaborative transition planning, including severely limited opportunities for autistic children to contribute to the planning of their own transition supports.

3.5.3 Digital stories to address the challenges of transitions

In a context where in-person visits to new educational settings, and reciprocal visits from staff to current schools was impossible, digital and video-based resources provided a potential

solution to sharing some of the information which might have otherwise been learned during visits. The utility of visual supports is well established as a tool to help autistic students navigate new environments (Hoy, Parsons and Kovshoff, 2018; Nuske *et al.*, 2019), and the digital nature of video means it is easily shared virtually between schools, new students, and their families. During COVID-19 restrictions, many schools provided videos and virtual tours to support the transitions of autistic students back to school or into new educational settings, and there is some evidence from parents that their autistic children found these resources to be helpful in the absence of in-person visits (Code *et al.*, 2022).

Digital stories seemed to provide opportunities to support students in ways that moved beyond simply creating video-based resources made by (mostly) adult, neurotypical school staff. By co-creating digital stories about Fairmead School with existing students, we hoped to better address the concerns of both new and existing students as they made the transition into the new school building which was due to be opened in September 2021. Furthermore, this shared endeavour gave us the opportunity to consider the co-creation of digital stories as a form of co-production which enabled participation, while adding to the resources which Fairmead School could offer to support students with their upcoming transition. In seeking to provide a more active means through which to enable and encourage young people's voices, perspectives and participation, I acknowledge that I take a particular epistemological position on the research, and this is explored more fully in the following section.

4 Research lens

This section sets out my epistemological position, namely, an embodied constructivist epistemology, which highlights the need to recognise and value neurodivergent students' different ways of knowing. I introduce the pivotal theories for my research, namely multimodality, and social semiotics, and discuss what they mean for my understanding of learning in the context of my research. Finally, I will consider some key concepts for my work, including agency and collaboration, before reflecting upon how they relate to the ideas of co-production and computational empowerment.

4.1 Epistemological position

The term paradigm is often used to refer to the successive overlapping waves of research which Kuhn (1970) described as scientific revolutions. In HCI specifically, Harrison, Sengers and Tatar (2007) recognised that these paradigmatic waves coincided with shifts in the dominant metaphors of interaction, which Agre (1997) suggested shapes what questions are addressed and what methods are used within research. Harrison *et al*. (2007) argued that these metaphors

of interaction can centre and marginalise different aspects of interactions, which are then pursued or neglected according to the dominant metaphor. For example, within the context of technological research, there have been paradigmatic waves relating to the metaphors of "interaction as a form of man-machine coupling" (Harrison, Tatar and Sengers, 2007, p. 3) (first wave of HCI) and "mind and computer as coupled information processors" (Harrison, Tatar and Sengers, 2007, p. 4) (second wave of HCI). However, the emerging interest in participatory design and embodied interaction, among other topics, suggested another shift towards what Harrison *et al*. (2007) termed situated perspectives, which was recognised as an emerging third paradigm, or third wave within HCI (Bødker, 2006).

Following on from the focus on embodied interaction and the situated perspectives of the third wave of HCI (Bødker, 2006; Harrison, Tatar and Sengers, 2007; Harrison, Sengers and Tatar, 2011), Frauenberger (2019) recognised the emergence of a fourth wave within HCI, which builds from the basis of entanglement between humans and technologies. As such, human action is seen as relational, being shaped by both cultural-material factors (e.g., technologies, laws, social norms) and other humans (Frauenberger, 2019; Homewood and Hedemyr, 2021). Within this paradigm, humans and technology are inseparable, meaning that HCI researchers should move from a focus on singular interactions to the enacted relationships between humans and technologies (Frauenberger, 2019). Given that my research questions address the process of co-creating digital stories (technological artefacts) and the affordances of this process in terms of agency, collaboration and learning of autistic children and young people, the focus of my research is relatively well-aligned with this new paradigm. However, my disciplinary positioning within Education necessitates a focus on the perspectives of the children and young people at the centre of my research, particularly given the intersectional marginalisation and exclusion I outlined in section 3. Consequently, my epistemological position more closely aligns with the that of the third wave of HCI.

Harrison, Sengers and Tatar (2011) developed the epistemology underlying work within the third wave of HCI, describing it as the answer to calls from feminist philosophers to address the gender, racial and class biases which underpin many contemporary scientific practices. Harrison *et al*.'s (2011) paradigmatic work follows work from Haraway (1988) which moved away from positivist notions of objectivity as the view from nowhere, towards one which instead embraces the situatedness of knowledge. Similarly, Harrison *et al*. (2011) highlighted the cultural, social, and historical context of the human actors who constitute knowers, and emphasised the locality of meaning created through embodied, often collaborative, experiences. As such, Harrison *et al*. (2011) follow an embodied constructivist epistemology where knowledge is constructed based on embodied human experiences. The conceptualisation of knowledge, interaction and action as embodied in humans means

knowledge can be manifested and expressed in many ways. By adopting this embodied conceptualisation of knowledge, I argue that it is important to accept these other ways of knowing and reduce the reliance on language as the only way of communicating knowledge. Importantly, this approach expands the potential contributions of those who struggle to communicate linguistically, as it emphasises ways of knowing which are not tied to a person's ability to express knowledge through language.

Approaching from a more methodological perspective, Heron and Reason (1997) presented a similar view that emphasised the importance of experiential knowing, which is in turn shaped by previous experiences. Though embodiment forms a less central focus to their argument compared to Harrison *et al*. (2011), they recognise experiential knowing as essential to other forms of knowing. Specifically, they consider experience as underlying linguistic conceptualisations of knowledge (propositional knowledge), creative expressions of it (presentational knowledge), and behavioural manifestations of it (practical knowledge). The embodied experience which constitutes knowledge is therefore central to *all* other ways of knowing.

Within this context, where knowledge is primarily formed through embodied experience, Harrison *et al*. (2011) highlighted the importance of understanding the context of meaning making, and emphasised how rich, pluralistic descriptions of the context of meaning making are key to knowledge production. In contrast, Heron and Reason (1997) recognised the need to engage with multiple perspectives in order to establish what can be regarded as some form of collective truth, emphasising the need for critically evaluating one's own subjectivity in order to engage effectively with the subjective views of others. In some ways this echoes Haraway's (1988) recognition of the situatedness of knowledge, though it does not stress the need to understand the context which comprises each person's situatedness to the same extent as Harrison *et al*. (2011). My own position based on embodied constructivism recognises the strength in understanding the wider context of a situation, while accepting the inevitable limitations of attempts to understand another person's experience completely. For this reason, within this thesis I often limit my discussion and investigation to specific aspects of students' experiences, such as those pertaining to learning or design. In doing so, I understand that I may have artificially segmented students' experiences in a way they may not recognise.

Within the context of autism research, it is important to recognise that the differences in neurology highlighted by the neurodiversity movement can lead to unique perspectives given the centrality of embodied experience to knowledge (De Jaegher, 2020). For example, differences in sensory processing may mean that the same environment and set of events provoke different cognitive, emotional and physiological responses across people of different neurotypes (De

Jaegher, 2013). When considering autistic and other neurodivergent people, it is also essential to remember how different interpretations of and responses to a given situation might be shaped by previous social interactions (Mitchell, 2016) and differences in attention or focus resulting from a tendency for monotropism (Murray, Lesser and Lawson, 2005; Murray, 2018). What's more, differences in experience based on neurotype may be further exaggerated through the process of communication, as a person's neurology may also influence the way they make use of propositional, presentational, or practical forms of knowledge. Different use of knowledge across neurotypes is recognised in the misunderstandings which prompted development of the double-empathy problem as a theoretical account of autism (Milton, 2012).

Within this context, there is a clear need for careful consideration of how researchers investigate autistic perspectives and experiences. Methods of inter-neurotype data collection which are limited to the consideration of propositional (linguistically-encoded) knowledge may be more susceptible to errors of interpretation, as a consequence of the double-empathy problem (Milton, 2012). Given the centrality of embodied experience to knowledge creation (Harrison, Sengers and Tatar, 2011), and the potential impact of neurotype on embodied experiences (De Jaegher, 2013) and interpretation of experiences (Mitchell, 2016), calls for flexible data collection methods to capture the inherently localised negotiation of meaning during knowledge creation are particularly pertinent to autism research (e.g. Gunkel, 2018). Digital stories, as developed and applied in this thesis, potentially provide a flexible means of knowledge production and later sections of the thesis critically reflect on whether and how this flexibility was demonstrated.

4.2 Key concepts and theories

4.2.1 Social semiotics and multimodality

Multimodal theory originates from Halliday's (1978) linguistic theory of social semiotics in which language is seen as a system of signs, with each sign being understood as the unification of a signifier (i.e., linguistic units such as words and phrases) and what it signifies (its meaning). Within social semiotics, speech involves the speaker considering what they intend to say and choosing what language to use from a series of options, which are shaped by the social functions and context of communication (Halliday, 1978). The influence of social context on the speaker's choices means that Social Semiotic theory sits in opposition to classic Saussurean conceptualisations of the sign where the relationship between words (signifiers) and their meanings (signified) is entirely arbitrary (Halliday, 1978). For example, a social semiotics perspective might consider the socio-cultural and political context and implications of using a

particular word to describe a particular phenomenon, whereas the Saussurean perspective would consider that the association between a word (signifier) and phenomenon (the signified) to be arbitrary, and therefore uninteresting. Furthermore, within a social semiotic approach, the role of the listener in trying to understand speech is not merely to match up each word with what it means, based on their own internal representations, but to consider how the context of speech has shaped what has been said.

Modern interpretations of multimodality build on the idea of communication as a system of social semiotics but challenge the primacy of language by extending what can be used to signify meaning to other forms of communication, i.e., modes (Kress, 2010; Jewitt, 2013). Each mode has its own affordances and limitations which are shaped by both their own nature (materiality) and by the social experiences of the communicator with that given mode (their communicative competence) (Kress, 2010). Social semiotics encapsulates this non-arbitrary relationship between signifier and signified within the notion of the motivated sign (Kress, 1993). The concept of the motivated sign posits that the unification of a signifier and signified by a sign maker is determined by the sign maker's interest, which reflects their experiences, and the choice between semiotic resources available to them at the time they create the sign (Kress, 2010). For example, the notion of the motivated sign might be used to explore the differences between a person who uses an outdated term because they do not know or understand the implications, compared with a person choosing to use the term as a slur to purposefully marginalise or offend.

Through the adoption of multimodality, I posit that the meaning behind any given expression is not assumed to be determined by macro-level social norms established through largely non-autistic communication. Instead, my adoption of multimodal theory highlights the agency of autistic co-creators in constructing and communicating meaning through all the modes available to them in any given context (Jewitt and Henriksen, 2016). By recognising the influence of previous experiences of communicators, the affordances of each mode, and the meaning encoded in each signifier by the communicator, the meanings encoded in a sign are considered to be highly contextual.

The adoption of multimodal theory fits well with my epistemological position, by recognising the importance of different ways of knowing, and communicating, and highlighting the need for flexible data collection methods which take these different ways of knowing and communicating into account. With respect to the use of digital stories as a method for exploring autistic children and young people's experiences, the social-semiotic basis of multimodal theory highlights the distinction between the sign itself, and the meaning (knowledge) which it is intended to communicate (Halliday, 1978). In doing so, digital stories are positioned as partial

representations of students' embodied experiences, where direct access to their embodied experiences is considered to be impossible. However, it is hoped that the nature of the digital stories as multimodal artefacts, to some extent, mitigates the partiality of that representation based on the opportunities to encode meanings across modes with complementary modal affordances, and the agency of students in making highly contextual decisions about how to negotiate the limitations associate with each means of expression.

The primary way I incorporate multimodal theory into my research is through my analysis, which is described in more detail in section 5.4 below. In the context of analysis, multimodal theory highlights the role of the researcher as a communication partner, who also has an active role as the interpreter of meaning (Kress & Bezemer 2015). This aspect of multimodal theory is particularly pertinent to the investigation of the experiences of autistic children and young people as it coalesces with social-developmental accounts of autism and the double-empathy problem, which highlight that successful social interaction is dependent on the interactional expertise of both communication partners rather than locating communication difficulties as residing within autistic people (Milton, 2012). As such, it is important to remember the influence of my position as a researcher in the interpretation of data, as a filter of the knowledge and understanding derived from the experiences explored in this research. To mitigate this, I included multiple sources of data within my analysis so that my interpretations could be more easily corroborated.

4.2.2 Conceptualising learning in a multimodal framework

Like communication, learning is also positioned as semiotic work within multimodal social semiotic theory (Kress, 2018). Consequently, learning is not conceptualised through the metaphor of knowledge acquisition (Bezemer and Kress, 2016) or developing competence (Canale, 2019), but instead as a process of transformation through engagement with the world. Additionally, new ways of sign-making extend and change the way learners themselves can create signs, combining new meanings with new words, creations or actions (Kress and Bezemer, 2015). Central to this understanding of learning is the notion of the motivated sign, which highlights the role which experience has in shaping the choices learners can make with respect to the semiotic resources they use to represent their intended meaning. Moreover, this conceptualisation highlights the embodied experiences and agency of the learner, as they actively remake signs (manifested as practical, presentational, or propositional knowledge) based on their understanding of previous meaning (their experiential knowledge), as explained in the following quote:

> Translated to a social semiotic multimodal account of learning, we say that every sign made is a new 'innovation'; its making is an act of 'creativity'. The ongoing, unceasing process of transformative engagement, of integration in 'inner' transformation, with a constantly new resultant state, constitutes learning. This turns the still largely taken-for-granted power relations (in communication as much as in learning-as-communication) on its head: it is the 'audience' who guarantees that there has been learning, not the 'teacher'.
> (Kress and Bezemer, 2015, pp. 158–159)

This approach highlights the multimodal nature of the learning, both through the ways in which learners come to *understand* new meanings or uses of semiotic resources, and through the manifestation of learning in the *remaking* of signs. Consequently, researchers adopting this approach to learning have focused on the learning environment and the tools and experiences used to shape learners' understanding (Kress, 2018; Saçak, 2021). However, Canale (2019) emphasised the constant and internal nature of learning as semiotic work, urging that educational researchers move beyond the questions of how and what students learn towards a focus on what we can recognise about their learning and how. For that reason, it is important to consider how education and assessment accounts for evidence of learning across different modes and ways of knowing, as traditional methods of evidencing knowledge such as written coursework and examinations only consider propositional knowledge encoded in the writing students produce for those assessments. I therefore consider data collection methods which seek recognition of students' learning beyond their propositional knowledge encoded in speech and writing as essential to examining students' learning experiences. Accordingly, my research examines co-creation of digital stories as a flexible creative method and form of co-production whereby students can choose to encode meaning across multiple modes. Furthermore, my research echoes Canale's (2019) calls to consider what we recognise as learning and how we do so, as the first study considers what students choose to represent about their experiences of participatory design within their digital stories, and the second study considers how the process of co-creating digital stories provides opportunities for learning.

4.2.3 Agency, participation, and voice

Given the importance of agency within multimodal social semiotics as the main theoretical framework for my research, and its pivotal role with respect to co-production, I now explore how agency has been conceptualised by others, and set out my own understanding, relating it to the ideas of participation and voice. Gallacher and Gallagher (2008) define agency as the power to act according to one's own intentions and purposes, in other words it can be seen as the power to choose and act upon those choices. This definition means that agency is an active process,

or a practice, whereby the choices available to a person at any given time are determined contextually (Moran-Ellis, 2010).

Moosa-Mitha (2005) recognised children's agency as a dynamic and relational practice, positioning participation as the successful practice of agency, centred around a child's intentions and desires. This contrasts with more prescriptive notions of participation, linked to engagement or disengagement with particular activities (Thomas, 2007). Within a relational conceptualisation of agency, power as a determining factor in the practising of agency is also seen as dynamic, contextual, and relational (Cornwall, 2008). The positioning of power is particularly pertinent to understanding the agency of children as interdependent beings who are reliant on adults for their basic needs (Moosa-Mitha, 2005). Furthermore, as children are constantly learning and developing, so too does their relationship with their physical environment and the people who shape it (Moran-Ellis, 2010). Consequently, children's socio-cultural context and agency have a reciprocal relationship, whereby the socio-cultural context of any instance of participation both shapes what their participation looks like and can be reshaped through their participation (Moosa-Mitha, 2005). In other words, a child's development and capacity shapes their socio-cultural context, which affect the options and choices available to them, but by participating and practising their agency they are also able to change their socio-cultural context, thereby dynamically redrawing the relationships which influence their agency. Consequently, children's agency is highly contextual and must be understood as a product of their development and their socio-cultural environment.

Through the adoption of this dynamic, relational, and contextual conceptualisation of agency and participation, I reject economic models of power, which position power as a currency which can be given or taken (Grover, 2004). Such economic models of power and participation imply that "deeper" forms of participation through which children and young people are granted more power are inherently more valuable. However, for some children and young people, being thrust into the positions of authority which such power entails is an unwanted experience (Holland *et al.*, 2010). Through focusing on participation as a function of practising agency, which is in turn dynamic, contextual, and relational, I intended to provide the autistic students I engaged with the opportunity to choose how they wanted to engage with my research, rather than enforcing normative or researcher-led assumptions of what their engagement might look like. Importantly, this conceptualisation of agency means that students' choices not to engage in planned research activities were also considered to be a legitimate form of participation.

Within this conceptual framework, where participation is intrinsically related to the practice of relational agency, and multimodal theory entails that a person's agency can be communicated across any number of modes, the idea of participation can also be closely tied to rights-based

notions of voice. Lundy (2007) presented a conceptual framework for voice centred around Article 12 of the United Nations Convention for the Rights of the Child (UNCRC) (United Nations, 1989). Article 12 sets out the right of children to express their views on matters which affect them, and for those views to be considered and taken into account (United Nations, 1989). Article 12 can be criticised on the basis that it is dependent on adult-centric notions of capacity and proportionality of response (whereby the right is granted based on a child's capacity to form views and caveated that views should be respected on the basis of age and maturity). Consequently, Lundy (2007) constructed a wider notion of voice as dependent on *space*, *voice*, *audience* and *influence*. In doing so, she highlighted the relational nature of children's participation and voice, which are often shaped by the adults around then.

More specifically in Lundy's (2007) framework, *space* denotes the context needed for children to be confident and comfortable to express their views. Although this relates to the literal space in which children may participate, it also refers to relational aspects of participation. For example, trusting relationships between adults and children encourage children to participate and express their views knowing that their views will be taken seriously (Lee *et al.*, 2022), and that doing so will not lead to dangerous or otherwise detrimental repercussions (Cornwall, 2008). Notably, within the rights-based model of voice, the idea of space is also used in reference to activities which support children to develop their own views, which is explored in more depth in Lundy and McEvoy (2012).

The second aspect of Lundy's (2007) framework, *voice*, relates to facilitating the expression of children's views. Drawing on Article 13 of UNCRC, which sets out the right to freedom of expression (United Nations, 1989), Lundy (2007) recognised the many ways through which children may choose to do this, and the responsibilities of adults to provide resources and support them in doing so. In practical terms this may involve scaffolding activities, providing materials, or supporting technology use through which children can express their views in ways which best suit them. Within my research, this rights-based validation of all forms of communication is underpinned by the adoption multimodal social semiotics, and my epistemological position which embraces autistic children's unique perspectives and ways of knowing.

Audience refers to act of listening to the views which children express (Lundy, 2007). Within a multimodal narrative, this relates to the role of the listener as interpreter of the meaning expressed through a given sign, which is also an agentive process dependent on knowledge of the sign-maker and the sign-making context. This is particularly important in relation to adults as the audience for autistic children's communication, as interpretation of their views is dependent on interactional expertise (Milton, 2012), rather than neurotypical conventions.

Finally, *influence* relates to how adults respond to the expression of children's views (Lundy, 2007). This final aspect refers to the reciprocal relationship between the act of participation and the context in which it occurs; in other words, the extent to which adults act upon the views of the child, allowing their views to transform their socio-cultural context. By including audience and influence as separate elements, Lundy (2007) highlighted the relational socio-cultural context of children, who may need to rely on adults to implement changes where children's individual agency does not allow them influence. However, by acting on behalf of or alongside children to influence the context, adults effectively help to dynamically redraw children's relational and socio-cultural contexts.

Within this section I have argued that the notions of agency, participation and voice are closely related, especially for autistic children who face intersectional marginalisation relating to their age and neurotype. Lundy's framework for 'voice' (2007) captures a high-level view of the relational nature of agency, participation, and voice, highlighting the role of adults in upholding children's right to have a say over their own lives. In doing so, she calls for transparency in decision making so that children and young people can see how their views have been incorporated into decision-making practices (Lundy, 2007), so that they might get to experience what it feels like to participate through successfully practising their own agency (Holland *et al.*, 2010). Likewise, the multimodal social semiotic perspective set out in section 4.2.2 highlights the agentive nature of micro-level decisions about contextual use of semiotic resources during the practice of sign-making. Consequently, on both a macro and a micro level my research considers agency and participation as highly relational and contextual.

Following this conceptualisation, Horgan *et al*. (2017) recognised the rare opportunities which children and young people have for participation in public life, where adult priorities and concerns tend to dominate. Horgan *et al*. (2017) noted the lack of agency which children are afforded in school settings, highlighting the need for research which critically reflects on how more opportunities for participation could be provided within educational contexts. In recognition of the limited opportunities for practising agency in school, my research considers how participatory design and co-creation of digital stories can provide opportunities for autistic young people's agency and participation.

4.2.4 Collaboration

As with agency, collaboration is a defining feature of co-production (Facer and Enright, 2016), and a key skill which both academic and non-academic partners in co-production need to develop (Barke, Thomas-Hughes and Howard, 2020). Accordingly, it is necessary to explore

what is meant by collaboration in more detail, beyond its common sense meaning of working together towards a common purpose or goal.

For Dillenbourg (1999), collaboration is a process of symmetry between those working together. Collaborative processes involve symmetry of action, relating to what each person does or is able to do, symmetry of knowledge, relating to their level of expertise, and symmetry of status, relating to their relationship to each other (Dillenbourg, 1999). The notion of symmetry, rather than equality, reflects an acknowledgement of difference (Dillenbourg, 1999), where the precise actions, perspectives and authority over a process need not be identical, but must be balanced such that no single person dominates what actions are taken, whose knowledge is represented or what decisions are made. Through the lens of agency and participation as defined in the previous section, this implies a synchronicity, and symmetry of participation, where the activities of collaboration represent the practising of collective agency to contribute towards shared intentions and goals. Within this conceptualisation, the act of collaboration is initiated and organised by the relatively equal collaborators, rather than being imposed by an external authority (Jones *et al.*, 2001).

In contrast, others have emphasised the benefits of more heterogeneous collaborators (Wood and Gray, 1991; John-Steiner, Weber and Minnis, 1998; Ludlow, 2011), who each bring a different set of knowledge and skills, and who have different restrictions and influences on their individual agency. These models represent examples of a strengths-based approaches, whereby the process of collaboration is guided by each person's unique contribution of knowledge and skills, for example:

> Indeed, we think that collaboration is first and foremost an opportunity to build on complementarity and succeeds when status differences within the group are overcome and the benefits of complementarity govern the process. (John-Steiner, Weber and Minnis, 1998, p. 780)

This conceptualisation explicitly highlights the need to acknowledge differences in power and agency, emphasises the potential benefits to collaborative outputs which can be possible when such dynamics are disrupted. I follow these strengths-based and difference-centred conceptualisations of collaboration, which both recognise that interdependence of collaborators is essential for the achievement of collaboration to exceed what could be expected on that basis of each individual collaborator's knowledge and skills. Nevertheless, within the context of complementary skills and strengths, it is important to examine further how imbalances in the activities, knowledge and agency of collaborators can be addressed and negotiated.

Griffiths *et al*. (2021) conducted a systematic review of collaboration in education to develop an account of the mechanisms which enable collaborators to work together while negotiating their differences. Their conceptual framework centres around collaboration as the culmination of relationship building, shared values, and active engagement, which facilitates shared decision making and collective action (Griffiths *et al.*, 2021), a depiction of their model is shown below in Figure 4-1. Within their framework, each element is seen as a building block which combine in an iterative way, such that the foundational blocks are necessary to support the higher blocks, which in turn reinforce the lower blocks. For example, trust and communication is needed to establish shared values, but acknowledgement and recognition of these shared values further reinforces the trust and mutual respect between collaborators. Similarly, active engagement of all collaborators, who undertake shared responsibilities and contribute actively towards collective goals, will strengthen their relationship and commitment to shared values. Finally, collaboration is achieved through shared decision making and implementation of those decisions, which in turn reinforces, and is supported by, the other elements of the framework.

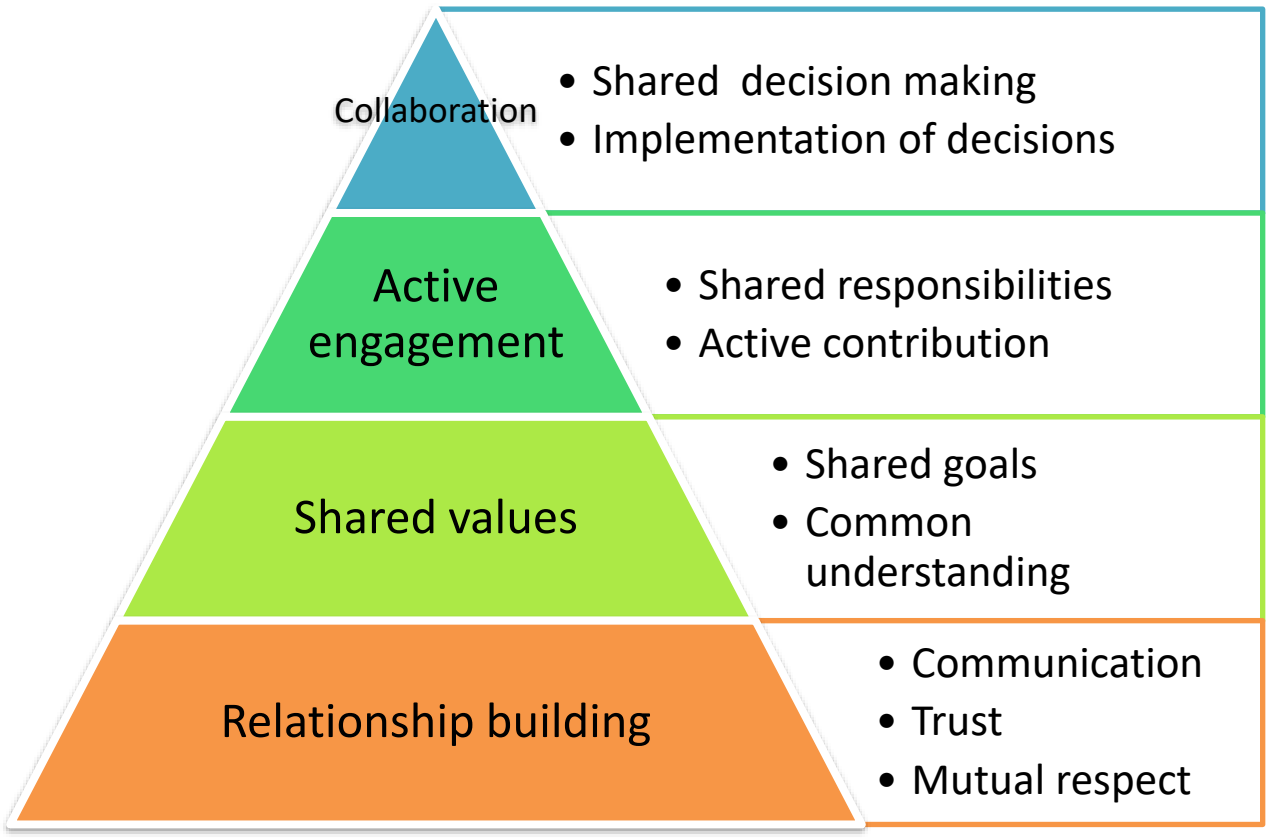


Figure 4-1: The building blocks of collaboration, based on Griffiths *et al*. (2021)

Though Griffiths *et al*.'s (2021) framework is based on research which primarily addresses collaboration between adults in educational settings, I consider it to also be relevant when within intergenerational collaborations, such as those which are central to participatory design with children and the co-creation of digital stories. Moreover, by considering Lundy's (2007)

framework for facilitating children's participation alongside Griffiths *et al.*'s (2021) framework for collaboration it may be possible to gain greater understanding about how to facilitate intergenerational collaboration. Doing so is important, as my intention is to foster a difference-centred, strengths-based approach, which aims to embrace autistic young people's perspectives. Consequently, Figure 4-2 shows how the building blocks for collaboration (Griffiths *et al.*, 2021) could coalesce with the four elements of Lundy's (2007) model of participation.

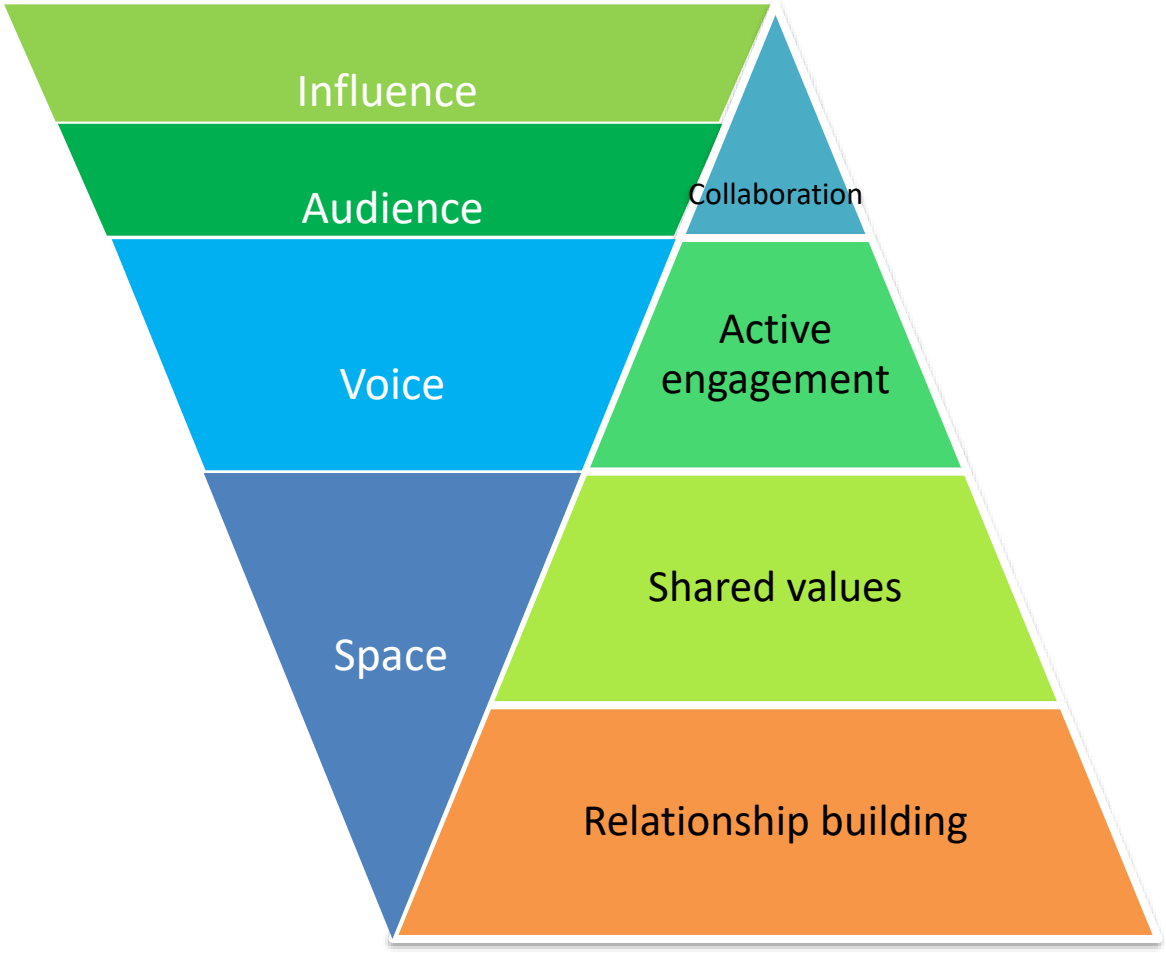


Figure 4-2: Factors facilitating children's participation within intergenerational collaborations

The main tensions between Lundy's (2007) framework for facilitating children's participation and Griffiths *et al.*'s (2021) framework for collaboration arise because of the lack of symmetry with respect to the agency of children in comparison to adults. This inequality between adult and child collaborators is shown through the depiction of space as a single element within Lundy's (2007) framework, which adults are responsible for. By contrast, among more equal collaborators the creation of a collaborative space for activity is built on foundations of trusting, respectful relationships and shared values, the formation of which is no single person or group's responsibility. Where Griffiths *et al.* (2021) assume that adult collaborators have relatively equal agency, and therefore capacity to act and contribute to shared decision making and

implementation, Lundy (2007) recognises the need for adults to actively engage in listening to children's views and responding to them such that children feel they have influence. Within intergenerational collaboration it may therefore be more important to ensure that children are able to see how they have influenced shared decision making, and how these decisions have contributed towards shared goals. Furthermore, the iterative conceptualisation of the blocks which form the foundations of collaboration reflect the dynamic, relational and contextual nature of agency. Through collaborative action, collaborators can shape the context of their collaboration, both in relation to the terms of the relationships between collaborators and their possible individual and collective actions. Consequently, my research needed to carefully consider how to build the relationships and spaces which facilitate autistic children's agency within the context of intergenerational collaborative activities, and this is discussed further in section 5.

5 Research approach

Although my research considers both participatory design and the co-creation of digital stories, which have each been considered methodologies in their own right (Spinuzzi, 2005; Facer and Enright, 2016; Thomas-Hughes, 2018b; Cumbo and Selwyn, 2022), I require another methodology to support my inquiry that is focused on the processes and the experiences of those involved. This section sets out the common methodology used across the two studies.

Specifically, I explore how my research adopts a participatory action research methodology for exploring autistic young people's experiences of co-creating digital stories and participatory design. I give an overview of the two key aspects which reach across both studies, namely, the centrality of reflexivity and the importance of relationships to the research. The subsequent section gives some detail about multimodal analysis, which was applied to the data collection of both studies. More information about the research design and data collection for each study can be found within 8 and 12, respectively. Finally, I give a brief overview of the progression of the studies.

5.1 Positioning my research within inclusive research, action research and participatory action research

As described in section 4.1, I adopt an embodied constructivist epistemology which, like Heron and Reason (1997), draws upon embodied experience as an important way of knowing about the world. Inclusive approaches to inquiry can be considered manifestations of these more embodied, experiential paradigms, in the same way that experiments can be considered

manifestations of the positivist paradigm. Inclusive research refers to research that challenges the traditional separation and power dynamics between researcher and research participants (Nind, 2014b). Instead of doing research *on* research participants, inclusive researchers do research *with*, *by* or even *for* the same groups of people (Griffiths, 1998). In doing so, the status and role of such groups is fundamentally changed from being unknowing objects of research (from within positivist paradigms) to knowing subjects and social actors who help shape and conduct research about their own lives. Due to the focus on disrupting traditional power dynamics, inclusive research is often conducted with groups and communities who have historically been marginalised both within research and by society more widely (Nind, 2014b).

Given the wide and varied ways in which marginalisation occurs, the inclusion of these groups also varies greatly, and inclusive research has been used as an umbrella term which covers participatory, emancipatory, and community-led research (Walmsley, 2004; Nind, 2014b; Seale, Nind and Parsons, 2014). However, the common thread across all these approaches is the promotion of the perspectives of neglected and marginalised groups to disrupt the existing systems of power which privilege some voices and silence others (Nind, 2014b). As indicated in section 3, my own work aims to centre the voices of autistic children and young people in particular, whose voices are often missing from educational research (Fayette and Bond, 2018). I therefore identify my research as adopting an inclusive approach.

As described in section 2.2, this research was conducted within the context of a research-practice partnership between me, a Doctoral student from the University of Southampton, and Fairmead School in Somerset. Within this context, the activities which the staff and students of Fairmead School and I conducted together formed both part of my Doctoral research and part of Fairmead's educational practice, which cannot easily be disentangled. Having said that, the activities completed across both studies constituted a deviation from the regular educational practices at Fairmead, which were intended to enhance the educational experiences of the students involved. As such, our joined activities and goals could easily be situated within action research, which has a strong tradition within Education as a practice-based inquiry oriented towards transformation and change (Noffke, 2009; Somekh and Zeichner, 2009).

Furthermore, my first study aimed to consider participatory design as an educational experience, and the similarities between action research and participatory design (Kagan et al., 2006) made action research an approach through which I could critically reflect on the participatory design process as a whole. Like participatory design, action research is explicitly iterative, however the nature of these iterative cycles are different (Hayes, 2011). Action research follows cycles of gathering information, planning, taking action and evaluating the effect (Adelman, 1993; Somekh and Zeichner, 2009). Whereas participatory design cycles

include conceptual, technical, and empirical investigations which feed into the design, development, evaluation and reflective analysis of technologies (Hayes, 2011; Borning and Muller, 2012).

In both action research and participatory design, the iterative nature of progress aims to allow for the acknowledgement and contribution of multiple stakeholders, whose views shape the conceptualisation of the issues being addressed over time, but what results from these contributions is different. In participatory design there is a necessary focus on the object of design that results from the process, whereas the output of action research is primarily new knowledge (Hayes, 2011). Consequently, the iterative nature of action research is sometimes represented as a spiral rather than a cycle to emphasise the progressive nature of understanding which changes the starting point for each iteration of research, action, and reflection (Hayes, 2011). This notion of continual learning and development of understanding through iterative reflection on action is something I adopt within my own research.

With respect to how action research relates to other inclusive methodologies, action research was identified by (Nind, 2014b) as a type of inclusive research. Action research embraces the value-laden nature of research and in doing so, recognises that research can either reinforce or disrupt the power relations which marginalise and oppress communities such as disabled people (Barnes, 1996). Action research aims to empower groups which are oppressed and marginalised to contribute to knowledge production with the hope that relationships outside the context of research begin to mirror the more consensual and democratic culture of the research process (Stringer, 1996). Consequently, action research aims to contribute to resolving issues of social justice for the communities involved (Adelman, 1993; Noffke, 2009; Somekh and Zeichner, 2009). I also aim to adopt the principles of action research set out by (Stringer, 1996) that research should be democratic, equitable, liberating and life-enhancing.

Nevertheless, and despite its orientation towards social change, action research does not always require marginalised groups to be centred through sharing of power and control over research (Greenwood, White and Harkavy, 1993). The use of the term action research is widespread, and as such has even been extended to cover some positivist field research (Reason, 1998). By contrast, participatory action research prioritises the most marginalised communities whose voices are often missing from research that follows more traditional paradigms (Cahill, 2007). This commitment to listening to the most marginalised voices stems from the history of participatory action research as a tool to counter the exploitative colonial influence of traditional academic research which has, according to some commentators, commodified the lives of indigenous communities (Bennett, 2004). For example, Stewart and Dene (2009) explored the experiences of Canadian Indigenous young people in research, who

reported that their experiences of being involved in participatory action research was culturally respectful and personally beneficial, in contrast to historical research which had reinforced the colonial marginalisation of Native peoples.

Moreover, participatory action research has also been applied to other contexts where research has traditionally been regarded as promoting oppressive narratives, for example in representing the voices of children (Langhout and Thomas, 2010), disabled people (Morgan, Cuskelly and Moni, 2014), people living in areas of gentrification (Cahill, 2007) and refugees (Martin *et al.*, 2019). As discussed in section 3, the voices of autistic people are often missing from autism research (Milton and Bracher, 2013; Parsons *et al.*, 2019). Furthermore, autistic young people are often seen only as the objects of research, rather than as knowing agents (Parsons, Ivil and Kovshoff, 2020), and their relationship to research is often presented through a wholly neurotypical lens (Fletcher-Watson *et al.*, 2019). By adopting a participatory action research approach, I aimed to take a step towards countering such exclusionary research practices.

In the previous discussion I have described my research within the context of inclusive research, action research and participatory action research, therefore some clarification is needed as to how I feel I can align myself with all three approaches. In Figure 5-1, I show how these different approaches relate to one another, though in reality the boundaries between these approaches are fuzzy and blurred. I follow Nind (2014) in recognising inclusive research as an overarching term which covers several different research approaches. Though action research can be inclusive, it is not inherently so (Greenwood, White and Harkavy, 1993; Reason, 1998) and Figure 5-1 therefore shows action research expanding beyond the realms of inclusive research. In contrast participatory research, and the point where action research and participatory research intersect (participatory action research) sit under the umbrella of inclusive research (Nind, 2014). In this way, I recognise aspects of all these approaches within my own work.

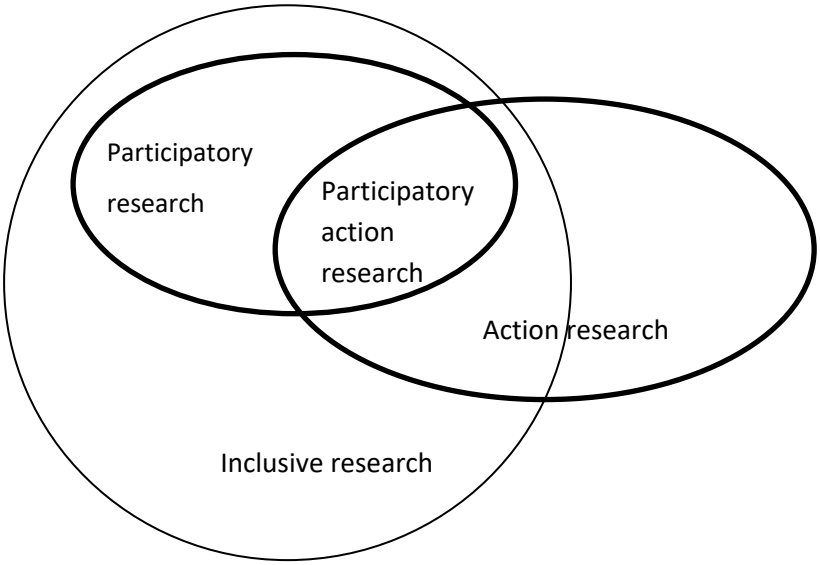


Figure 5-1: Relationship between participatory action research, action research, and inclusive research

Both projects followed an iterative action research-type spiral, consisting of planning, action and reflection (as shown in Figure 5-2). As both projects were conducted during lesson time, each session with students was considered the basis of an iteration, for which I planned activities, resources and supports, that would support the collective actions which contributed towards our larger aims and objectives. These activities were varied and diverse, with the first study including graphic design, computer programming and composition necessary to develop a computer game, in addition to the mapping, filming, describing and editing which formed the main activities of digital story co-creation. Each iteration closed with critical reflection about the planning and actions, including reflexive thinking about what we had accomplished in the session, and how this had been achieved. Along with the adoption of inclusive methods which allow stakeholders to express views as they wish, an iterative approach allows adjustments of representation, ensuring that the views of less powerful stakeholders are equitably captured. As in Hayes (2011), the notion of a spiral rather than a cycle reflects the way each iteration changed my understanding, with the consequence that each iteration starts from a different position.

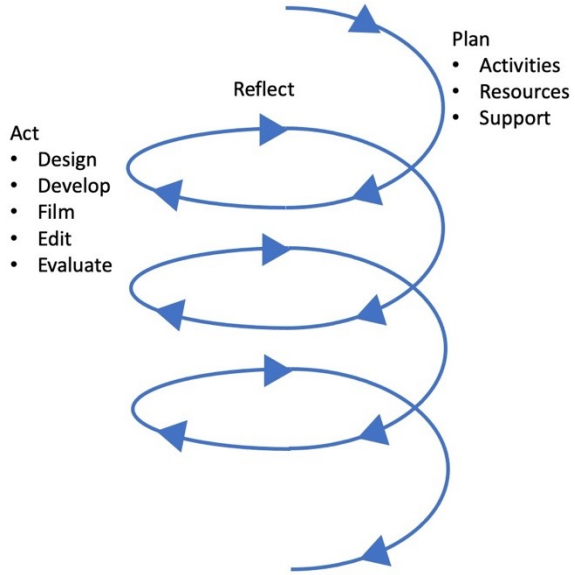


Figure 5-2: Participatory action research spiral

Based on my understanding of participation as the successful practice of agency (see section 4.2.3 for more details), my adoption of a participatory approach centred on the views and perspectives of autistic students emphasises the opportunities which research activities may create for students to practice agency. This contrasts with other conceptualisations of participatory research which primarily focus on achieving deeper forms of participation which entail increased responsibility and control for those participating (Arnstein, 1969; Hart, 1992, 2008; den Houting *et al.*, 2021).

Hart's (1992) participation ladder is shown in Figure 5-3, and identified various forms of non-participation and increasing degrees of participation. Similarly, den Houting *et al*. (2021) supplemented their reimagining of Arnstein's (1969) model, through the addition of the community perspective, which depicts the research engagement as being any thing from being "forced into it" to "doing it ourselves" (den Houting *et al.*, 2021, p. 149). The focus on empowerment in such models is laudable in response to the historic exclusion, exploitation and denial of agency for both children (Hart, 1992, 2008) and autistic people (den Houting *et al.*, 2021) in research. However, the focus on empowerment often reinforces normative assumptions of what good participation should look like, without acknowledging that increased responsibility for decision making may not be what particular groups, such as children (Holland *et al.*, 2010), want. Instead, the participatory nature of my research entails the creation of a space in which children can practice agency (Lundy, 2007), with the *option* rather than the *obligation* to engage in decisions about the direction, methods, and progression of research, as well as how they wish to contribute to any given activity.

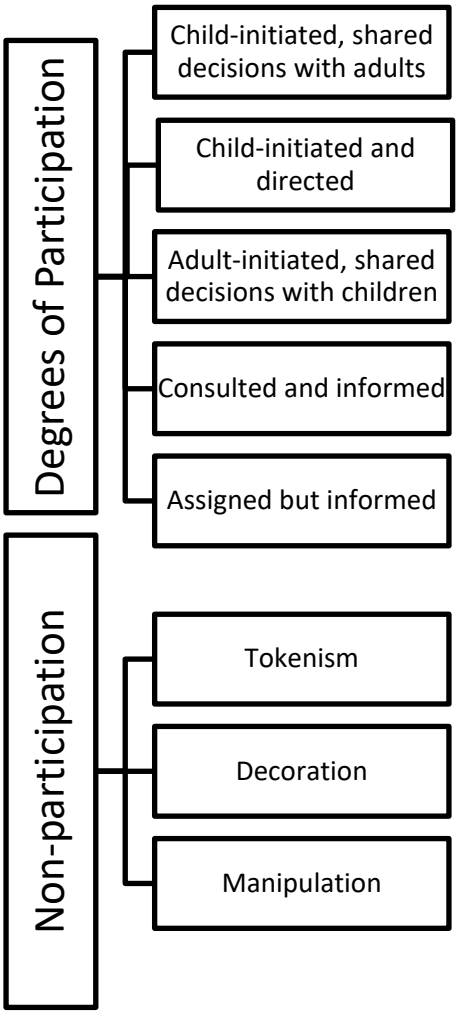


Figure 5-3: Ladder of participation as set out by Hart (1992)

Within the context of school-based research, it is particularly important that participatory researchers do not fall into existing patterns and roles that reinforce rules, procedures and structures which encourage conformity and may compromise children's individual agency (Fox, 2013). Gal (2017) recognised the complexity of these factors affecting participation and described them through an ecological model which highlighted the need to build scaffolding to encourage participation where the wider context discourages it. For example, hollow commitments to children's participation in politics through formal structures intended to engage children in decision making but which have no power to enact such decisions bring into question the extent to which children' views are valued at all (Thomas, 2007). In schools, as a context where opportunities for agency and participation are often limited (Horgan *et al.*, 2017), scaffolding is especially important to enable children to participate, however as children practice agency children may increasingly choose to share in responsibility and decision making with less need for support and scaffolding (Gal, 2017). Therefore, careful consideration was given to how students would be supported to practice their agency within my research, with flexibility about how they could engage in each activity being a key principle throughout.

As students participated in multiple ways, their named role within the research must reflect this. Within action research, the groups that collaborate with researchers to co-produce research are often termed co-researchers (Martin *et al.*, 2019), whereas within participatory design, those who collaborate with researchers and designers are often called co-designers (Holone and Herstad, 2013). However, as the role students from Fairmead School occupied within my research straddles both these activities neither seems to be an adequate description for them. Instead, I use the term co-creator to describe their role. This not only reflects the duality of the children's roles in terms of research and design, but also highlights their contribution to co-constructing knowledge through the co-creation of digital stories.

5.2 Role of reflexivity

Reflexivity is the process of critical reflection through which a researcher considers their position, value and beliefs and how they have influenced the direction and outcomes of their research (Etherington, 2004). The development of reflexivity as a practice for social science researchers follows the acceptance of the partiality and situatedness of knowledge associated with postmodern, feminist and interpretive epistemologies (Mauthner and Doucet, 2003). As such, reflexivity is a difficult process through which researchers interrogate the messiness of their research, and the social, ethical and political context which shapes their entanglement with the subject and their findings (Lumsden, 2019). Within qualitative research, reflexivity is often seen as a mark of rigour (Etherington, 2004), however the adoption of participatory and collaborative approaches to data collection have seen it repurposed as a way to examine both the dynamic nature of power relationships (Orr and Bennett, 2009) and to promote more ethical research practices which extend beyond the procedural ethics required by higher educational institutions, especially in the UK (Phelan and Kinsella, 2013). Additionally, my own reflexivity draws on traditions from both participatory design and inclusive research more widely that position critical reflection as a tool for assessment of participation.

From the perspective of participatory design, Frauenberger *et al*. (2015) suggested a model for examining quality within participatory design based on its rigour and accountability. They suggest rigour and accountability can be assessed qualitatively based on critical reflection about the epistemology, values, stakeholders and outcomes of such projects and the coherence between the tacit assumptions underlying them. Frauenberger *et al*. (2015) provided a useful structure upon which to reflect and assess quality within participatory design in a way that is consistent with its underlying assumptions and values. Overall, their approach is flexible, and allows for the multiple interpretations of participation within participatory design without emphasising the correctness of one approach over another.

Similarly, Nind and Vinha (2012) provide a set of criteria (provided in Table 5-1) for researchers to reflect on in order to judge the quality of inclusive research; though these criteria were intended for research involving people with learning disabilities it can be applied to inclusive research with other groups. Within my participatory action research methodology, critical reflection is a core step in the iterative cycle of planning, acting and reflecting (see Figure 5-2 for a visualisation of this). As such, this has allowed me to build a reflexive practice which interrogates my own impact on students' agency and participation. This process was supported across both studies using reflexive diaries, through which I reflected on how students have participated during each research interaction, and what influenced this, including my own impact on their agency. Within the second study, I also developed a practice of reflective conversations with staff after each session. Additionally, both studies encouraged students to critically reflect on their experiences through co-produced evaluations at the end of each study.

Table 5-1: what makes good inclusive research? A summary of criteria for judging inclusive research from Nind and Vinha (2012)

1	The research answers important questions, which could not be answered using less inclusive approaches.
2	The research reaches people, communities and knowledge which could not be accessed without an inclusive approach.
3	The research uses and reflects upon the insider, cultural knowledge of the people with learning disabilities involved.
4	The people involved recognise the research to be authentic.
5	The research impacts the lives of people with learning disabilities.

5.3 Centrality of research relationships

Given the highly collaborative nature of my research and the experiences of co-production I wished to investigate, establishing good relationships with both the staff and students within Fairmead School was essential. This recognises the importance of relationships in providing the foundations of trust, effective communication and mutual respect that underpin the other building blocks of collaboration (Griffiths *et al.*, 2021), and as the domain through which adults create the space for children to practice agency (Lundy, 2007), which I discuss in sections 4.2.3 and 4.2.4, respectively.

Although the importance of research relationships has been acknowledged in co-production more widely (Horner, 2016; Thomas-Hughes, 2018a; Co-production Collective, 2020), the need for allowing time to build relationships is not always acknowledged within participatory technology design. Millen (2014, chap. 7) recommends getting to know autistic children through

observation sessions and conversations with teaching staff before involving them in participatory design projects to ensure that tasks are tailored to children's interests and appropriately scaffolded, and children feel comfortable fully engaging with tasks in the presence of the researcher. Despite this, Millen (2014) only allowed a single informal meeting with children before moving on to introductory sessions as part of the formal project. Similarly, Benton *et al*. (2012) included only one session of rapport and relationship building before commencing their design sessions with autistic young people.

Previous work by autistic scholars has criticised neurotypical researchers for their lack of such expertise (Arnold, 2012; Milton and Bracher, 2013), which stems from insufficient experience with the autistic communities they write about. Similarly, Fletcher-Watson *et al*. (2019) advocate for spending time with autistic communities to ensure that research agendas are relevant to the communities they involve. Furthermore, Milton (2014, p. 496) describes the need to develop "interactional expertise" with the autistic community in order to facilitate the kind of equitable knowledge sharing required for inclusive research within neurodiverse communities. Therefore, the design of each study involved a period of time dedicated to forming relationships and getting to know students ahead of commencing research activities.

Nevertheless, there are ethical implications relating to the intention to developing research relationships with autistic young people, especially within the context of school-based research. For example, Jones and Stanley (2010) highlighted the difficulties of conducting research which does not simply replicate the dominant culture in schools. Similarly, Fox (2013) warned of the difficulty of creating research relationships with young people which do not replicate the pervasive discourses of compliance which are central to behavioural and attainment expectations in most schools. In particular, research relationships can be particularly problematic within contexts where cultures of compliance through coercion and persuasion sit in opposition to ethical commitments to autonomy and respect which should be manifested through voluntary participation and informed consent (Carusi and de Grandis, 2012; Frauenberger, Rauhala and Fitzpatrick, 2017; Schroeder *et al.*, 2019). As a result, I was aware of the need to create relationships with students that were qualitatively different to those that they shared with their teachers. In addition to the flexible nature of activities we did together, I also took steps to differentiate myself from school staff by wearing casual clothes and asking students to use my first name.

Others have described how establishing research relationships with young people strengthened researchers' ethical practice, by enabling young people to have more say over reporting. For example, Holland *et al*. (2010) described how developing good relationships with the young people enabled them to have more agency over selection of data for analysis, during their

project which explored the lives of looked-after children. For example, some of the young people involved felt comfortable enough to assert what data they wanted to be excluded from analysis (Holland *et al.*, 2010). Consequently, I considered the building of relationships with students to be an integral part of my ethical practice, and part of my commitment to consent as a continuous process beyond the signing of formal documents. More details of my approach to procedural ethics for each study can be found in sections 8.3 and 12.3, respectively.

5.4 Multimodal analysis

As described in section 4.2.1, social semiotics and multimodal theory are key to my understanding of meaning, and the way people express their different ways of knowing. In terms of analysis, this meant selecting a method which could be used for a range of data sources, including complex multimodal artefacts such as digital stories. As the advance of digital technologies and communication has created a plethora of opportunities for such multimodal artefacts (Unsworth, 2011), there are several methods of analysis which build upon multimodal theory (Jewitt, 2009; Pirini, Matelau-doherty and Norris, 2018). For example, multimodal discourse analysis interrogates the ideational, interpersonal, and compositional systems which underly how semiotic resources are employed (Jewitt, 2009), whereas multimodal (inter) action analysis focuses on how meaning unfolds during expressions and responses to meaning making (Norris, 2011). In turn, social semiotic multimodal analysis explores sign-making as a social process, reflecting on how the context of meaning-making is manifested by the sign-maker through the non-arbitrary connection between modal resources and what they signify (Jewitt, 2009).

The focus on both what meaning is encoded in multimodal artefacts and how they reflect the context of meaning-making within social semiotic multimodal analysis closely reflects my research questions, relating to how digital stories capture the experiences of autistic young people in participatory design, and the process of co-creating digital stories. Furthermore, social semiotic multimodal analysis explicitly addresses the agency of the sign-maker and how their choice of semiotic resources reflects social relations, power, signification, interests, audience, and social actions which sign-making can realise (Jewitt & Henrikson, 2016). Therefore, social semiotic multimodal analysis allowed me to investigate the process of meaning making, looking at both the sign itself (the content and signification of digital stories) and the sign makers' interest (how choices reflect the students experiences and the context of sign-making).

Additionally, social semiotic multimodal analysis highlights my role as a researcher to interpret the signs contained in multimodal artefacts, based on my understanding of both the context of

their creation, and their creators. In doing so I am repositioned from an impartial observer of the meaning which students convey through their digital stories, to someone with an active role as an audience to their views, who ensures they have influence, as set out in Lundy (2007). However, by assuming this role, I must also justify my right to interpretation (Jewitt and Henriksen, 2016) and demonstrate communicative competence with data (Kress, 2010). Consequently, I have aimed to practice reflexivity through my analysis, by setting out the interactional expertise which underpins each of my interpretations. Additionally, I attempted to triangulate interpretations by drawing from multiple sources of data, and where needed I simply asked students to check that I had understood their intentions correctly.

5.4.1 Building analyses from micro-level transcriptions

As social semiotic multimodal analysis focuses on the process of sign-making it generally concentrates on detailed micro-analyses of a few select examples (Jewitt, 2015; Jewitt and Henriksen, 2016). Within my research I focused on micro-level details from a range of communicative moments to draw out wider conclusions about student co-creators' experiences, and how they chose to represent and express these within the co-produced data. Consequently, initial stages of data familiarisation, viewing and sampling are key to the analysis procedure (Jewitt, 2015). As the digital stories provide a particularly flexible means of representing the experiences of student co-creators which allow students to draw upon a wide variety of modes and semiotic resources, my analysis drew heavily upon them as a starting point. As mentioned above, my interpretations were strengthened by drawing upon other sources of data, including co-produced interviews, interim plans and designs and researcher reflections. More details of the precise methods of data collection for each study can be found in sections 8 and 12, respectively.

Within my research, I employed micro-level transcriptions of the digital stories as a starting point for analysis. Micro-level transcriptions aim to highlight the relationships between smaller units of multimodal compositions (Flewitt *et al.*, 2009). For rich, multimodal data, the process of transcription allows researchers to produce more detailed descriptions of these complex multimodal artefacts, which supports the initial stages of analysis, focusing on the content and composition of different modes (Jewitt, 2015). The process of transcription is considered crucial within multimodal data, as researchers must choose which modes to transcribe, and how these transcriptions will be organised (Flewitt *et al.*, 2009; Bezemer and Mavers, 2011). Transcription is a key aspect of analysis for the researcher in terms of their own understanding of the data as it can be seen as the remaking of signs (Bezemer and Mavers, 2011), through the transduction of meaning from one mode to another. As such, transcription is a learning process (Kress and

Bezemer, 2015), through which the researcher gains deeper insight into the original instance of sign-making. Examples of micro-level digital story transcripts can be found in D.1, G.1, and G.2.

Other communicative moments were selected for transcription based on themes which I developed based on transcribing and early analysis of the digital stories, and reviewing other data sources. Once key moments were identified, they were transcribed. Though some transcriptions of these additional moments considered micro-level details of co-produced interview data, macro-level transcriptions were employed to give insight into the relationships between large complex, multimodal objects. For example, I used macro-level transcriptions to set the interim design artefacts and plans (including images, music, and storyboards) within the context of researcher observations and reflections. This was intended to connect the instances of meaning making with the context in which they were made. Examples of macro-level transcripts can be found in D.2, G.3, and G.4.

5.4.2 Stages of analysis

Once transcriptions of the digital stories which formed the starting point of each study had been created, each digital story could be considered as a multimodal artefact, through which I could interrogate students' decisions about how and what meaning they wished to convey. The analyses were conducted using Nvivo 12 and consisted of four stages, following the three stages described in Jewitt and Henriksen (2016), followed by a final stage which addressed calls for moving beyond descriptions by linking analysis to wider social theories (Jewitt, 2015).

Stage one started with individual mode, by considering which modes were relevant, what their constraints and potentials were and how they worked in context (Jewitt, 2015; Jewitt and Henriksen, 2016). This involved the creation of inventories of modes, semiotic resources, and how they were used and configured (Jewitt, 2015; Jewitt and Henriksen, 2016). In practice, this was realised as a close reading of original data alongside the transcripts, followed by coding of the transcripts for meanings and modes within it. Examples of initial coding for meaning and modes can be found in D.3 and G.5. Using this coding, I used a search across the mode-related and meaning-related codes to create an inventory of modes and meanings, examples of these can be found in D.4 and G.6. I also used memos linked to each of the codes to reflect upon the opportunities and constraints of each of the modes.

Then stage two moved on to the composition of modes, and how they combined and contribute to the overall meaning (Jewitt, 2015; Jewitt and Henriksen, 2016). The examination of multimodal composition within multimodal artefacts considered how interacting modes created or transformed meaning (Jewitt, 2015; Jewitt and Henriksen, 2016). This stage involved

the comparison of memos and codes for each mode, and the creation of further memos reflecting the composition of meaning across modes.

Stage three considered the context of meaning making, exploring how the digital stories could be considered as instances of motivated signs which reflected the students' interests as sign-makers (Jewitt, 2015; Jewitt and Henriksen, 2016). This stage linked the data with the context of meaning making through comparison across sign-makers and contexts (Jewitt, 2015; Jewitt and Henriksen, 2016). This involved comparing data from different students and contexts to strengthen conclusions about their interests of the sign-makers.

Finally, the fourth stage sought to draw connections with wider social theory (Jewitt, 2015; Jewitt and Henriksen, 2016), addressing the criticism of social semiotic frameworks as primarily descriptive tools. In this case I turned to the concepts of agency, collaboration, learning, and the significance of different ways of knowing.

5.5 Overall progression of research

This first Part of my thesis has detailed the background of my research, introducing Fairmead School, and providing the academic and professional context which I bring to it. I argued the rationale for the research, in terms of exploring the opportunities which digital stories might provide in contributing to the educational experiences of autistic children and young people, before detailing my epistemological lens and the key concepts and theories I draw from. Finally, I provided a methodological overview of the two studies, detailing the common approach which tied them together, despite the slightly diverging focus of each one.

Although the two studies are presented within the thesis separately, they were not conducted entirely sequentially. Figure 5-5 shows how research activities progressed across both studies, with the activities for the first study in the left column (with blue boxes) and the activities for the second study in the right column (in orange boxes). In Part Two and Part Three, respectively, I will detail more precisely what each study entailed, before returning to a higher level view in Part Four to discuss the wider findings and implications for my research as a whole.

Figure 5-4: Chronological progress of research

Part Two Exploring experiences of autistic children in participatory design through digital stories

6 Introduction

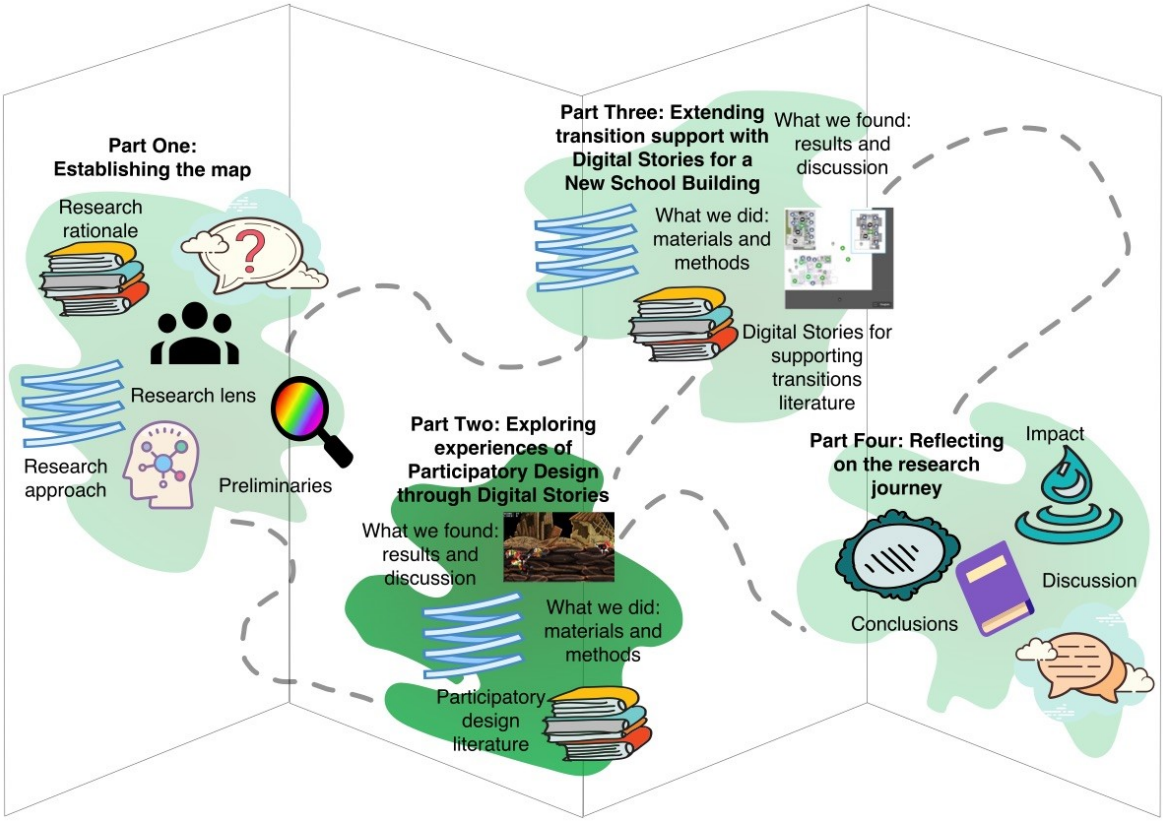


Figure 6-1: Positioning part two within the thesis map.

In Part One I set out the context, rationale, lens, and approach that I followed for my Doctoral research. Now I move on to the first study which investigated how digital stories can provide insights into students' experiences of participatory design. The methodology and initial findings from a subsection of this study were published as Ward *et al*. (2022).

This Part has three further sections: the 'Background' chapter explores the literature, establishing what is already known about autistic and neurodivergent students' experiences of participatory design, and how other researchers have gone about investigating those experiences. The next section 'What we did: materials and methods' gives an overview of the study, before providing more details about the participants, methods, and analysis. The final chapter in his Part of the thesis is 'What we found: results and discussion', which presents the findings, drawing upon four digital stories, as well as co-produced interview data and outputs of design sessions. Finally, this part will explore how these findings relate to existing literature

about autistic and neurodivergent young people's experiences of participatory design and reflect on how the digital stories have enabled these insights.

7 Background

7.1 Children's experiences of participatory technology design

Historically, children represent a group which has been systematically excluded from processes of technology design (Druin, 2002). Within a research context, this exclusion often reflected assumptions of children's vulnerability or incompetence (Morrow and Richards, 1996). When children are considered as inherently vulnerable, they tend to be excluded from participation under the notion of protecting them from exploitative practices (Morrow and Richards, 1996). Similarly, when they are considered incompetent their contributions are not taken seriously or considered less valuable than adults' accounts (Morrow and Richards, 1996; Grover, 2004). In both cases children are considered the objects of research and denied agency as experts in their own lives. These conceptualisations of children as incompetent and vulnerable were proliferated in design practices, where the requirements of children's technologies were frequently accessed and decided through consultation with adults considered experts on children, such as parents or teachers (Druin, 1996). However, children's agency and position as developing social actors was increasingly recognised and reinforced through the sociology of childhood (Moran-Ellis, 2010). This theoretical position also reflected the growing legal recognition that children should have a say in decisions which affect their lives (United Nations, 1989). Within design research, these changing perspectives on childhood are reflected through ever increasing inclusion of children in technology development, including in participatory design (Druin, 2002; Benton *et al.*, 2014; Malinverni *et al.*, 2014; Schepers, Dreessen and Zaman, 2018b).

Although children have been involved in participatory design for some time now, most of this research has not considered or focused on the impact of their involvement. Guha *et al*. (2010) recognised the importance of studying the impact of participatory design on the children involved, not least to ensure that such involvement does not cause them harm, but also to improve understanding of the potential benefits. As participatory design is already a lengthy process, Guha *et al*. (2010) did not recommend running participatory design research purely for the purpose of investigating its impact, instead suggesting that a better approach would be to qualitatively assess the impact of participatory design which is primarily focused on other questions. However, given that the technologies resulting from participatory design are not guaranteed to be usable (Parsons and Cobb, 2014), or, indeed, implemented as real solutions

to design problems (Kyng, 2010), I argue that our lack of knowledge in this area justifies research mainly for this purpose.

To better understand the effects and experiences of being involved, it is important to clearly document different stakeholders' contributions and roles within participatory design processes. This is particularly important given the variation in the way children are involved within different participatory design projects, and the extent to which these differences might affect their experiences of being involved. Namely, deeper participation where children are able to make a meaningful contribution to designs might result in more benefits to children than more tokenistic involvement in which children have minimal impact on the final designs (Benton and Johnson, 2015).

Where the effects of participation in design processes on children have been investigated, studies have mostly focused on the children who have had a greater input and influence over designs (Benton and Johnson, 2015). However, data collection methods have remained largely centred around adult accounts rather than facilitating and documenting children's views and experiences, reflecting wider trends which deny participants influence over the focus and methods of participatory design evaluations (Bossen, Dindler and Iversen, 2016). For example, Benton and Johnson's (2015) systematic review detailing the benefits of involvement in participatory technology design for children with special educational needs, showed that of the 27 papers discussed, 24 were based on reports from adult participants and only six considered children as sources of data about their own experiences.

Where children did participate in the evaluations of the design process, their contributions were limited and often not clearly described. For example, Mazzone *et al*. (2008), Millen *et al*. (2011), and Zarin and Fallman (2011) all made use of "informal evaluations" (Benton and Johnson, 2015, pp. 33–34) to gain insights into the experiences of the children and young people involved. However, only Zarin and Fallman (2011) described what this involved explicitly: discussions with the children and teachers who attended prototype testing sessions. In the case of Mazzone *et al*. (2008), informal evaluations were conducted alongside questionnaires for the teenagers who took part in the design sessions for their computer game to encourage reflection on emotional behaviour, but the nature of informal evaluations remained unclear. Similarly, Millen *et al*. (2011, p. 97) stated that "all of the students also said that they enjoyed the session" after their involvement in early prototype evaluation sessions, but no information was given as to the context in which these comments were made or how children's views were sought. The lack of transparency about how this information was collected calls into question the reliability of these claims.

The remaining papers which asked children about their experiences of being involved in participatory technology design used questionnaires (Benton *et al.*, 2012; Benton and Johnson, 2013) and interviews (Hernandez *et al.*, 2013). Though both methods gave children and young people a chance to express their views, the extent and depth of insight was somewhat limited as questions presented to them were chosen and designed by adults, meaning that the questions were inherently centred around adult expectations, priorities, and concerns.

Where children have produced information about their experiences of participatory technology design that is less bounded by adult expectation, this data is often not used in evaluation. For example, during the final session of Benton *et al*.'s (2012) participatory design project to produce a maths game with autistic children, the children produced a display of their work which they presented to their headteacher. The children used this display as a memory aid while completing the survey evaluating the final prototype. The display itself was not considered as a source of data, even though it was a creative expression of children's experiences. This display was much less closely tied to the concerns and priorities of the researchers conducting the overall evaluation and so was seemingly overlooked by them. Indeed, this reinforces the argument being made here that children's participation in design processes has remained largely undocumented and underexplored. This neglect for the impact of participatory design as a process is particularly pronounced within the contexts where children's involvement is motivated by the pragmatic benefits of their inclusion (i.e. improved usability of designs) rather than more idealistic goals (i.e. children's collective empowerment through design) (Balka, 2010; Frauenberger *et al.*, 2015).

7.2 The educational turn and computational empowerment

Education is one field where more idealistic approaches to participatory design have been employed, resulting in closer attention to the process of participatory design as well as its outcomes (Frauenberger *et al.*, 2015). Within educational contexts, participatory design has been applied as a methodology which promotes student voice through the unsettling of traditional classroom power dynamics (Cumbo and Selwyn, 2022). However, others have focused on the pedagogical potential of participatory design as a technique which offers sustained and engaging learning opportunities by moving beyond individual interest to align activities with students' cultural values (DiSalvo and DesPortes, 2017).

Building from participatory design's origins within technology development, there has been particular interest and focus on its application within ICT and computer science education (Göbl, Guenther, *et al.*, 2023), as an approach which supports students to learn digital skills and computational thinking (Iversen, Smith and Dindler, 2018). This educational focus is also a

response to questions raised about the political efficacy of contemporary participatory design research, and renewed calls to explore the lasting impact and societal issues which participatory design might address (Balka, 2010; Bødker and Kyng, 2018). As such, the increasing focus on participatory design as an educational tool recognises the importance of design and digital skills, within growing recognition that schooling must provide children and young people with the skills and competencies needed to shape their increasingly digitalised world (Iivari, 2020; Iivari *et al.*, 2023). This application of participatory design for technology-focused learning has been conceptualised as a process of computational empowerment (Iversen, Smith and Dindler, 2018; Dindler, Smith and Iversen, 2020).

As a pedagogical approach, computational empowerment draws from liberatory models of education (Freire, 1970; Bhattacharya, 2020) and constructionist approaches (Papert and Harel, 1991) which stipulate the need for agency and meaning for individuals within learning experiences (Iivari, 2020) in order to empower children and young people through designing and making (Iivari and Kinnula, 2018). However, the lack of clarity around definitions of empowerment within participatory design (Kinnula *et al.*, 2017) left a parallel need for further clarity about what is meant by empowerment within computational empowerment as an educational application of participatory design.

In response, Iivari (2020) developed a model which captures the multifaceted nature of empowerment, extending from mainstream ideas about impact over decision making, to more critical conceptualisations intended to liberate people from oppressive forces, on both individual and collective levels. On an individual level, Iivari (2020) argued that technology education can only be empowering to students if it is meaningful and agentive, if it allows students to *have a say* within design decisions, and if it builds their competence. From a more critical perspective, Iivari (2020) argued that technology education should increase students' awareness of other's needs, promote critical reflection on the oppressive nature of the status quo, and drive critical action against the status quo such that children are enabled to participate in shaping the space for action while sharing power with adults (Iivari, 2020).

The comprehensive nature of this model recognises the complexity of empowering children and young people through digital technology, especially within the context of formal education. However, many of the characteristics included in Iivari's (2020) model assume adult-centred ideas of power (Grover, 2004) that sit in opposition to the relational model of agency (Moosa-Mitha, 2005; Gallacher and Gallagher, 2008), which I argue is more suitable when considering neurodivergent children and young people in 4.2.3. Though the potential leanings toward adult priorities are acknowledged (Iivari, 2020), there remains a need for a more flexible understanding of empowerment which the relational idea of agency provides, such that the

priority is for children to decide how to participate for themselves, rather than for them to take on responsibilities which they may not want (Holland *et al.*, 2010).

Nevertheless, the development and expansion of computational empowerment as a research area has started to address this tendency to focus on adult-centred notions of power (Iivari, 2020) by drawing attention to the incompatibility between bottom-up (agency-focused) goals and its top-down (learning-focused) implementation within formal education (Göbl, Guenther, *et al.*, 2023). This tension between children's agency and contemporary schooling, which is dominated by learning goals, documentation, and assessment, has been raised within discussion of how computational empowerment might be implemented in formal educational settings (Eriksson and Torgersson, 2021; Göbl, Duvivié, *et al.*, 2023; Göbl, Guenther, *et al.*, 2023). However, evaluations of computational empowerment continue to privilege adult-centred methods and perspectives (Göbl, Guenther, *et al.*, 2023). Accordingly, the present study builds on the computational empowerment literature, by seeking to investigate the potential of more idealistic manifestations of participatory design within educational contexts. In contrast to the wider literature (Eriksson and Torgersson, 2021; Göbl, Duvivié, *et al.*, 2023; Göbl, Guenther, *et al.*, 2023), I hoped to implement a more holistic view on the resulting learning by attending more closely to the perspectives of the autistic children and young people involved.

7.3 A focus on autistic children- why is it needed and what has been learned so far? Where are the gaps in research?

As argued in Part One, within the rationale for this study, a deficit-based conceptualisation of autism has led to researchers focusing on the design of technologies intended to reduce the prevalence of characteristics related to autism which are perceived to be deficits or impairments (Woodcock and Georgiou, 2008). Furthermore, some of the characteristics typically associated with autism have been regarded as barriers to the inclusion of autistic children in design (Frauenberger *et al.*, 2013). For example, Fletcher-Watson *et al*. (2016) argued that limited social cognitive skills meant that autistic children were not likely to engage well with other people's perspectives and ideas. They therefore decided to exclude autistic children from contributing directly to their designs, instead engaging with other adult stakeholders to develop their iPad app for autistic young children (aged six and under) to practice social communication skills (Fletcher-Watson *et al.*, 2016).

Notions that autistic children lack imagination have resulted in rarely involving them in idea generation, meaning that autistic children are only able to contribute to designs in reactive rather than proactive ways (i.e., as sources of feedback but not initiators of ideas). For example, Zarin and Fallman (2011) developed a table-top multitouch game for children with Special

Educational Needs and Disabilities (SEND), and engaged a group of six children who either were on the autism spectrum or had Down's syndrome in formative feedback. The iterative design process made use of rapid prototyping and testing with these users as a group, and individually alongside their teachers, as well as discussions about testing with the child users and teachers after each session. Despite feeling that this discussion-based feedback was beneficial to designs, Zarin and Fallman (2011)did not engage their user groups in idea generation, meaning that children remained reactive to the designers' prototypes rather than contributing proactively to designs.

When researchers start from an assumption of limitations they are sometimes surprised when children express their own agency and contribute to designs in a meaningful way. For example, Woodcock and Georgiou's (2008) project developed a digital interactive environment to address the so-called triad of impairments associated with autism, including improving children's confidence during interactions with others. Given their deficit-focused aims, the researchers were surprised by the agency and capabilities of autistic children:

> One of the children with an ASD [Autism Spectrum Disorder] in the school became a design partner, commenting on what he did and did not like and when he was fed up with the whole project!
> **(Woodcock and Georgiou, 2008, p. 150)**

Such attitudes possibly reflect intersectional experiences of autistic children who can be marginalised in a number of ways including race, gender, geographical location, and age (Cascio, Weiss and Racine, 2021). Such attitudes reflect out-dated conceptualisations of children as incompetent and vulnerable (Morrow and Richards, 1996; Grover, 2004), and overly medicalised notions of autism which focus on perceived deficits (Broderick and Ne'eman, 2008) rather than the whole child. This exclusion results in limited opportunities for autistic children to be experts and recognised for the value of their lived experiences. As an activity which provides an opportunity for applying expertise and lived experiences (Bratteteig and Wagner, 2012), participatory design may be a particularly beneficial activity for autistic children.

However, where autistic children are encouraged to contribute further, researchers often focus on the ways in which autistic children are not capable of participating in design without additional supports (Woodcock and Georgiou, 2008; Millen, Cobb and Patel, 2011). For example, Benton *et al.* (2012) described how they supported collaboration between autistic children within a design team including their teachers and researchers, who completed a

participatory design project to develop maths games over 6 weekly sessions. These sessions were supported by at least one adult per child:

> Adult team members help mediate social interaction where needed, enforcing social rules like turn taking and listening to others. Children are also praised for good examples of social interaction to highlight correct behaviour.
> **(Benton *et al.*, 2012, p. 2601)**

Describing the adults' role in this way seems to promote "correct" (neurotypical) behaviours and implies a deficit-focused view of autism, rather than enabling children to contribute their views in ways that might have been more comfortable and fruitful for them. This suggests there is substantial scope for exploring participation in design, and the design process, in a different, more strengths-based way.

7.4 Towards a more active role for autistic children in participatory design

Projects that have incorporated more strength-based conceptualisations of autism have focused on what autistic children *can* contribute and developed tools to support them in becoming initiators in design, rather than just reactors to adult-led projects. For example, Frauenberger *et al*. (2013) developed a tool to support autistic children in moving from reactors to initiators of feedback during the ECHOES project, which aimed to develop collaborative technologies to support the development of social and communication skills. Frauenberger *et al*.'s (2013) tool provided on-screen smiley stickers which could be used to annotate the ECHOES technology during interactions with it. This supported autistic children in providing feedback without prompting and engaging in more complex feedback without needing to rely on verbal communication. Similarly, Frauenberger *et al*. (2019) described how they distinguished between Play Partner and Active Observer roles for adult researchers within design, to facilitate children's behavioural contributions by providing each child with an adult peer to interact with during design workshops while another adult provided the structure for sessions. In doing this, Frauenberger *et al*. (2019) were able to explore children's interests and concerns without relying on their verbal expression of ideas. This approach encapsulates a wider conceptualisation of *voice* which moves beyond a reliance on speech or other formal communication methods. In doing so it places more value on the experiential knowledge of the child and emphasises the need for more accessible ways of formulating that knowledge into presentational knowledge which is more amenable to sharing with others.

Furthermore, strengths-based participatory design has also explored the different ways in which children can contribute to designs by allowing them to do so in multiple ways, which reduces reliance on adult interpretation of their behaviour. Malinverni *et al*. (2016) suggested a method of examining participatory design data which better acknowledged the situatedness of knowledge, and the multiple methods through which knowledge could be expressed. In their approach, they ensured that autistic children had multiple methods of contributing to designs through a mixture of exploratory embodied interaction and more traditional drawing-based design. Exploratory interaction activities involved two roles: explorers who navigated and captured photographs of the interaction, and detectives who offered their interpretations and ideas about the digital environment (Malinverni, Mora-Guiard and Pares, 2016). The children swapped roles after 15 minutes, so each child had the opportunity to do each role. While the detective role relied more heavily on verbal communication, it also involved the children in capturing and interpreting data about the digital environment in a way which reflected the children's embodied experience without relying on adult interpretation of that experience.

This wider view of voice, which includes interpreting behavioural cues, is particularly important when working with non-verbal autistic children. Wilson *et al*. (2019) developed a co-design method for use with minimally verbal autistic children, and reported on its application to a project with 5-8 year olds. Their method drew on practice from within the field of speech and language therapy, and focused on *moments of interaction* between communication partners in the form of joint attention, turn-taking and imitation (Wilson *et al.*, 2019). Through phases of preparation for interaction, designing and reflecting in the moment, and reflecting on action, the researchers sought to understand the children, interact and develop the design based on micro-interactions, and reflectively evaluate the resulting design (Wilson *et al.*, 2019)). . Wilson *et al*. (2019) found that through this focused attention on children's interactions researchers were able to adapt their designs to better support children's interaction and motivations. This model challenges what it means to have a voice and to contribute to designs for children who have often been excluded from design practices due to heavy reliance on verbal communication, tasks which cause a high cognitive load, and fine motor skills. It expands the view of what inclusive design could look like and promotes the view that design methods must be adjusted to ensure minimally verbal children are also able to contribute to design processes.

The notion of adapting methods to suit the skills and abilities of children is critical to more inclusive design practices, however this is simply not possible without considerable knowledge of the children who are to be included and the context in which the design activities will take place. Benton *et al*. (2014) described a framework for involving neurodivergent children and young people in technology design. The Diversity for Design model is based on four principles: 1) understanding the culture, 2) tailoring to the individual, 3) structuring the environment, and 4)

providing support. These principles draw heavily on the TEACCH program of structured teaching for autistic children (Mesibov, Shea and Schopler, 2004). Though the aim of the TEACCH program is not conformity of autistic individuals to neurotypical societal standards, its objective remains that autistic individuals should function comfortably within society as it currently exists (Mesibov, Shea and Schopler, 2004). In other words, the person is required to adjust to the environment rather than the other way around. Though this aim was initially progressive it falls short of the radical acceptance of autistic people promoted by the neurodiversity movement (Benton *et al.*, 2014). However, the Diversity for Design framework highlighted the need to allow educational practice as well as theory to influence design processes, in a way which embraces the expertise of teachers in promoting collaborative activities. This knowledge was integrated in design practices through iteratively improving protocols to give sufficient flexibility to encourage and facilitate the creative contribution of all children in all workshops (Benton *et al.*, 2014).

Despite these advances in understanding how autistic children's contributions to design can be facilitated, children are not always included beyond idea generation activities so that they may be empowered by seeing how their ideas have been adopted into designs. For example, Millen *et al*. (2011) held design workshops with three autistic students aged 13-14 years where students reviewed an existing game prototype and designed their own game to support making friends. While the design workshop represented "an important opportunity for the children where they are encouraged to voice their opinions" (Millen, Cobb and Patel, 2011, p. 100), the researchers did not make the most of this opportunity by extending involvement so that the students were able to see how their voices were listened to through seeing their ideas manifested within working prototypes. In this way, children are often given the opportunity to *have a voice* within participatory design, but not always allowed to *have a say* (van der Velden and Mörtberg, 2014).

7.5 Barriers to adopting autistic children's contributions

Parsons and Cobb (2014) argued that the ways in which autistic children can have a say in participatory design could be modelled by three factors which describe the complexity of designing in conjunction with multiple stakeholder groups: Theories, Technologies, and Thoughts. Parsons and Cobb (2014) likened these three factors to the layers in a sandwich such that a reasonable design solution (sandwich) can only be made if the three layers complement and align with each other. *Theories* relates to the theoretical influences built into designs; these can be educational, or relating to user requirements, and should complement but not replace the perspectives of users. *Technologies* and their affordances form the filling of the sandwich and, importantly according to Parsons and Cobb (2014), researchers should reflect on how

such affordances relate to the theories and user perspectives forming the other layers of the sandwich. Finally, *Thoughts* represent the views and perspectives of the various stakeholders involved in designs. Parsons and Cobb (2014) described how each layer of the sandwich must align with the others, and how tensions both within and between these layers can lead to minimisation of user's contributions (Thoughts) to designs.

For example, Bossavit and Parsons (2017) reported tensions between (Theory-driven) objectives for the technological output of participatory design, and a desire to value the contributions of their adolescent autistic participants (Thoughts). Bossavit and Parsons (2017) developed a collaborative game with two 15-year-old autistic boys using Kodu alongside their ICT teacher. During the design process, the two young people were supported to be "independent and autonomous learners" (Bossavit and Parsons, 2017, p. 38), and shared responsibility for decision-making in the design. In doing so, power about design decisions was shared between the adult researcher, the teacher, and the students. In doing so, theoretically driven objectives for the game (to support collaborative learning) were deprioritised compared to the ideas and perspectives of the student co-designers. Consequently, the resulting game required synchronisation between in-game characters' actions, but did not require interaction between players (Bossavit and Parsons, 2017). In promoting the power and agency of the students in the design decisions from the start (Thoughts), the (Theory-driven) outcomes for the games themselves were missed.

Similarly, during the development of a collaborative block-building game in a 3-D virtual environment, Parsons and Cobb (2014) described how conflict between the *Thoughts* of the stakeholders involved resulted in misalignment between the design and the affordances of the *Technologies* being used to implement the design. During the design, Parsons and Cobb (2014) engaged with non-autistic and autistic students, as well as teachers, to design and evaluate their collaborative block-building game. During testing, students enjoyed exploration of the 3-D Virtual Reality environment, but teachers requested that this functionality be limited to minimise children's distraction away from the learning objectives (Parsons and Cobb, 2014). However, in prioritising teacher's views and the objectives for the technology (Thoughts), the researchers created an artificial limitation of activity which did not match the affordances of the 3-D virtual environment (Technologies) or the preferences for exploration identified by the children (Thoughts). In trying to achieve fixed goals for the technologies produced through participatory design, Parsons and Cobb (2014) reported that they were unable to act upon the feedback from students. This led to suggestions that fixed objectives regarding the outcome of participatory design may be incompatible with deeper degrees of participation of users in design processes (Parsons and Cobb, 2014; Bossavit and Parsons, 2017), which require researchers and designers to share decision making with children.

Where others have found ways of balancing the contributions of multiple stakeholder groups, and achieved their own objectives for the resulting technologies, they have done so by limiting the scope over which stakeholders have a say. For example, within their project to develop a Kinect game for autistic children to promote social interaction, Malinverni *et al*. (2017) did this by setting out what elements of the game each set of stakeholders were going to contribute to in advance, and only combining perspectives where they did not anticipate conflict between stakeholders' views. This process of consultation and merging contributions is visualised in Figure 7-1.

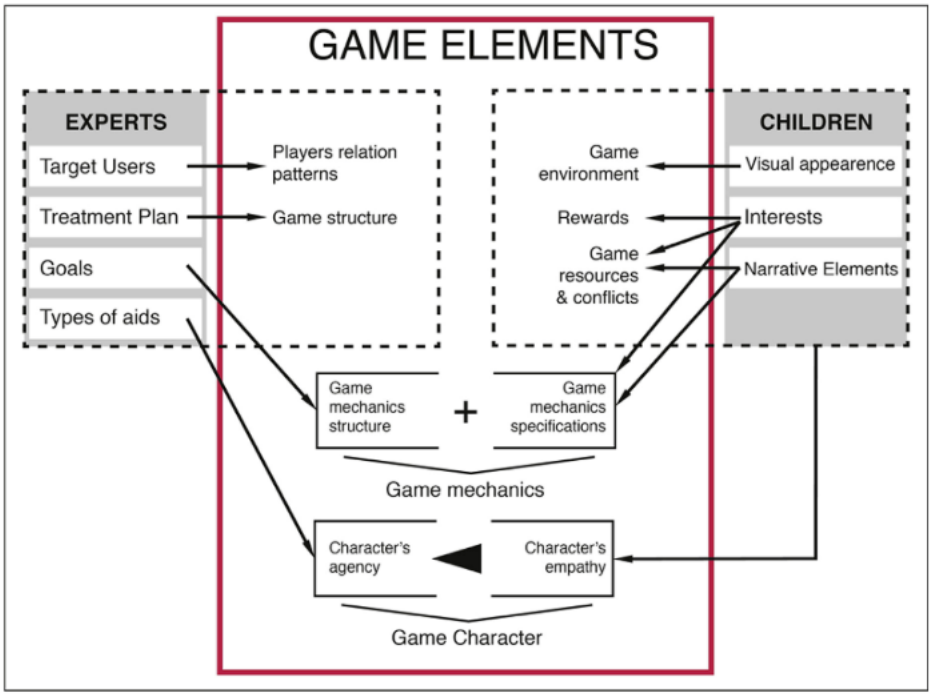


Figure 7-1: Diagram from Malinverni *et al*. (2017, p. 542) showing how different stakeholders contributed to different elements of game design, and where designs involved merge together contributions from multiple stakeholders.

In the case of the autistic children involved in Participatory Design workshops, pre-planned game elements and objectives were decided by the research team and therapeutic experts and presented via a narrative, where intentional gaps in the narrative were indicative of where the researchers sought children's contributions (Malinverni *et al.*, 2014). This appears to have been successful, as the children involved reported pride in seeing their ideas included in the prototype system (Malinverni, Mora-Guiard and Pares, 2016). Nevertheless, creative contributions were highly structured and constrained within the narrative context of the workshop, meaning that children's agency and ability to contribute to decision-making relied heavily on how researchers coordinated different stakeholders' contributions. While there was room for creative contributions from the autistic children involved in the design workshops, their power over design decisions was limited to very specific aspects of the game determined *a*

priori by the researchers' government of their contributions. In contrast, there has been relatively little work investigating the potential of participatory design for autistic children in contexts which aim to promote rather than limit the agency of autistic children in design and so this is the focus of my own work.

Projects which have encouraged more empowered participation of autistic children in design have chosen to remove objectives for technological outputs to develop technologies which reflect children's experiences more holistically. For example, Frauenberger *et al*. (2019) described the production of nine different technologies developed through participatory design with nine autistic children aged six to nine years old. Unlike other projects mentioned earlier, the researchers did not set objectives for the technological outputs so the outcomes for each child were bespoke, dynamic, and extremely personalised. Consequently, the technologies developed reflected a much wider view of the children's lives, and while some were intended to support areas of difficulty for the children , they were in no means limited to this and the choice of design/prototype was very much led by the children. For example, one child expressed difficulty in recalling social situations and so Frauenberger *et al*. (2019) developed a wearable audio-visual device which would record and photograph interactions so the child could better reflect and learn from them. In another instance, they developed a Super Mario-themed alarm clock with vibrating pillow and pressure mat to create a positive start to the day. In this way, so Frauenberger *et al*. (2019) expanded the possible roles of technology within autistic children's lives beyond its frequent conceptualisation as a therapeutic tool while valuing children's contributions as capable knowers. I aim to build on this kind of approach by focusing on the development of technologies without therapeutic goals, and instead aiming to maximise the agency of student co-creators in design decisions.

Similarly, Spiel *et al*. (2017) demonstrated how children's contributions could be respected within the evaluation of participatory design processes, by co-producing evaluations which prioritised the perspectives of the children rather than adults. Spiel *et al*. (2017) described how children and researchers can work together to set goals and decide on methods, gather data, and interpret results. For example, the aims for evaluating the Super Mario alarm clock mentioned earlier were established by creating an advert for the alarm clock, and researchers suggested methods for evaluation which were linked to the child's interest in creating newspapers (Spiel *et al.*, 2017). Spiel *et al*. (2017) stressed the role of the researcher as a facilitator of these activities who provides scaffolding and support so that children can participate in ways which suit them. In doing so, they respected the complexity of children's experiences and the validity of children's different ways of knowing, especially those ways of knowing that are communicated without speech or language. The adoption of a participatory research methodology is the main way I prioritise autistic children's perspectives within my own

research. However I intend to go further than Spiel *et al*. (2017) by extending participatory evaluation to look at children's experiences of participatory design more holistically, rather than focusing primarily on participatory evaluation of the objects resulting from design. This holistic approach to experiences of participatory design will also highlight its potential as a learning process for autistic children specifically, as these are areas which have been little studied within the literature.

7.6 Research question and aims

As a consequence of the lack of attention which had been paid to autistic children's experiences of participatory design, this study aimed to address the following question: What insights can digital stories provide into autistic children's experiences of participatory design?

In order to do this, the initial plans for the current study were developed alongside staff from Fairmead School, based on the school's intentions to promote learning opportunities for computer programming, game design and technology-related careers. As such, the study was intended to:

1) Implement participatory design to co-create a computer game with students from Fairmead School;
2) Inform students about careers within the technology sector through interactions with relevant professionals;
3) Explore students' experiences through co-produced research involving digital stories.

8 What we did: materials and methods

8.1 Overview

This study intended to address the gap in understanding of autistic and other neurodivergent students' experiences of participatory technology design processes. To do this, a group of students undertook a collaborative design project to produce a computer game during extra-curricular activity sessions, colloquially referred to as "coding club", which were supported by me and school staff. To address the school's priorities for authentic and engaging learning experiences relating to careers in the technology sector, students engaged with guests from the industry who are involved in developing software professionally. The aim of these sessions was to promote the mutual learning which has been reported across interdisciplinary teams in other participatory design projects (see Bratteteig, 1997; Robertson *et al.*, 2014 for example). Consequently, several technology professionals (virtually) attended the coding club and shared

their expertise relating to designing and developing technologies. In addition to game design and development, student co-creators also engaged in co-produced research to explore their own experiences of participatory technology design. This involved working together to develop digital stories about their experiences, co-producing reflective interviews, and developing questions for an evaluation survey about the game.

The study initially started in November 2020, with the first 26 sessions being completed during the 2020-2021 academic year. Due to time constraints the final phase of evaluation was completed in the following academic year (2021-2022), with the final interviews taking place in January 2022. The progression of research activities is depicted in Figure 8-1. In the following sections, I provide more details about the study, including details about who took part, what they contributed and how the resulting data were analysed.

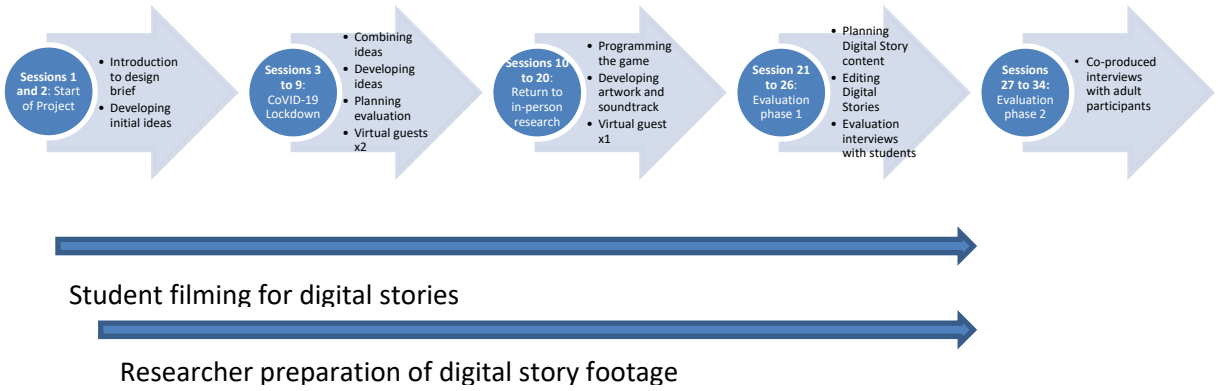


Figure 8-1: Progression of research during game design study

8.2 Research collaborators: student co-creators and adult participants

8.2.1 Recruitment

As depicted in Figure 8-1, the study was somewhat interrupted by the COVID-19 lockdown in January 2021. Consequently, the following participants were recruited over two main groups. The first group was recruited in November 2020, based on their attendance of the extra-curricular coding club which I had supported since the beginning of the academic year. Following the restriction of movement of students between classes, a few additional students and support staff were recruited in January 2021, based on membership of the teacher who supported coding club's tutor group. Staff were recruited at both these points, with some additional members joining along the way due to the ever-changing staffing situation because of COVID-19. The restricted movement between groups also meant some students were unable to

participate for some time, re-joining the project when internal school restrictions were lifted in May 2021. As a researcher committed to inclusion, the exclusion of some students for even a short while was disappointing, but it was a compromise which was necessary for the completion of the project given that many more of the students would leave Fairmead at the end of the academic year to move onto Further Education.

8.2.2 Characteristics

In total, two girls and twelve boys took part in the project aged 13-16 years. Diagnoses and ethnicity were recorded from EHCPs (UK Government, 2022a), for students whose parents allowed me to view them. Of those whose parents allowed access to the children's EHCPs, all were reported as being White British. In terms of diagnoses, most were on the autism spectrum, or had autistic traits. Many were identified as being neurodivergent in other ways, such as having ADHD, dyslexia, global developmental delay, or other learning disabilities. Accordingly, it was paramount that consideration was made with respect to the neurodiversity of the group, and the subsequent need for flexible data collection methods which allowed for communication and expression of different ways of knowing.

In terms of adult participants, nine members of school staff participated in the project, and four technology industry professionals. Participants took part in an optional questionnaire to provide their demographic information, a copy of the questionnaire can be found in Appendix C.7. In terms of school staff, seven women and two men participated. The distribution of ages across the group is shown in Figure 8-2. All identified as White British, and either did not have a disability or chose not to disclose their disability status. With respect to the technology industry professionals, all were White British men, without disabilities. Three were aged 25-34 and one was aged 45-54.

Within the context of growing awareness of the lack of racial diversity within autism research more widely (Pierce *et al.*, 2014; Broder-Fingert *et al.*, 2019; Pickard, Reyes and Reaven, 2019), the lack of racial diversity within my sample can be considered a limitation of the study. However, the geographical context of Fairmead School within Somerset means this is to be expected. The most recent census shows 86.4% of students in Somerset are White British (UK Government, 2022c), and 83.1% of students within Somerset's Special Schools are White British (Department for Education, 2021b). Furthermore, while efforts have and are being made to increase diversity within the technology sector (Brodock and Massam, 2016; Kaul, 2021), the field is still largely dominated by White non-disabled men (techUK, 2021).

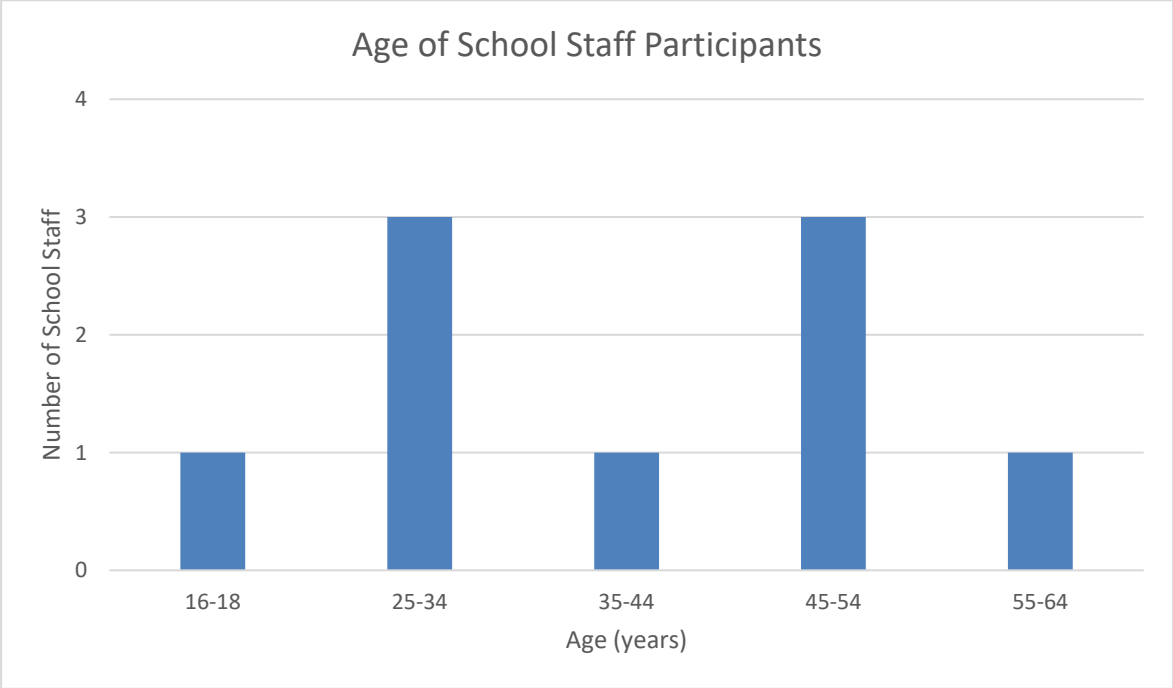


Figure 8-2: Bar chart showing age of school staff who participated in the participatory design study

8.3 Procedural Ethics

Adults (teaching staff and industry professionals), young people, and their parents all gave written informed consent to participate. A video was provided to young people and their parents to inform them about the project, as well as written information sheets. Adults were given the opportunity to contact me or a senior member of school staff to ask questions about the project before giving consent to participant. Students were given the opportunity to ask me any questions they had in person before being given the consent forms, and they were supported by myself or other members of staff with reading information sheets and consent forms where required. In total, fourteen KS4 students engaged in the research as co-creators; we were supported by eight members of school staff, and four technology professionals from outside the school. Copies of the information sheets and consent forms, as well as links to the information videos can be found in Appendix B.

8.4 Co-creating computer games in the coding club

As described in our Research approach, we used a participatory action research methodology, which is depicted in Figure 8-3. Each week of coding club was considered a different iteration of

the plan-act-reflect spiral which underpins the participatory action research approach[1]. I completed each iteration with support from school staff, especially for the planning and action stages. The planning stage involved ensuring that activities scheduled for each session contributed to the completion and evaluation of the game, and that there was sufficient flexibility and choice within activities and resources to account for the groups' preferences and interests. The action stage referred to facilitating the coding club sessions alongside school staff, and ensuring students had sufficient support to develop the required digital skills for the activities they chose. The iterative nature of this reflective spiral allowed progressive implementation of adjustments to the activities and resources available to student co-creators each week, as well as development of guidance provided to staff to maximise the opportunities within sessions for students to practise agency over when and how they engaged during coding club.

Student co-creators participated in designing, developing, and evaluating a computer game with support from staff where needed. Student co-creators also documented their own process of participation through the creation of digital stories, which are described in more detail in section 8.6 below. As mentioned in the Overview, most of the sessions took place during and extra-curricular coding club between December 2020 and July 2021 during which time the study was the main activity. The remaining evaluation interviews with adult participants taking place between November 2021 and January 2022, while other students who had joined the coding club for the 2021-2022 academic year did other activities. An overview of the activities and objectives of the sessions held in the 2020-2021 academic year is shown in Table 8-1.

[1] For visual clarity, the participatory action research approach is here presented as a series of individual cycles. However, as described in section 5.1, conceptually the process is more akin to a spiral, with each new planning phase building directly upon reflections from the previous session.

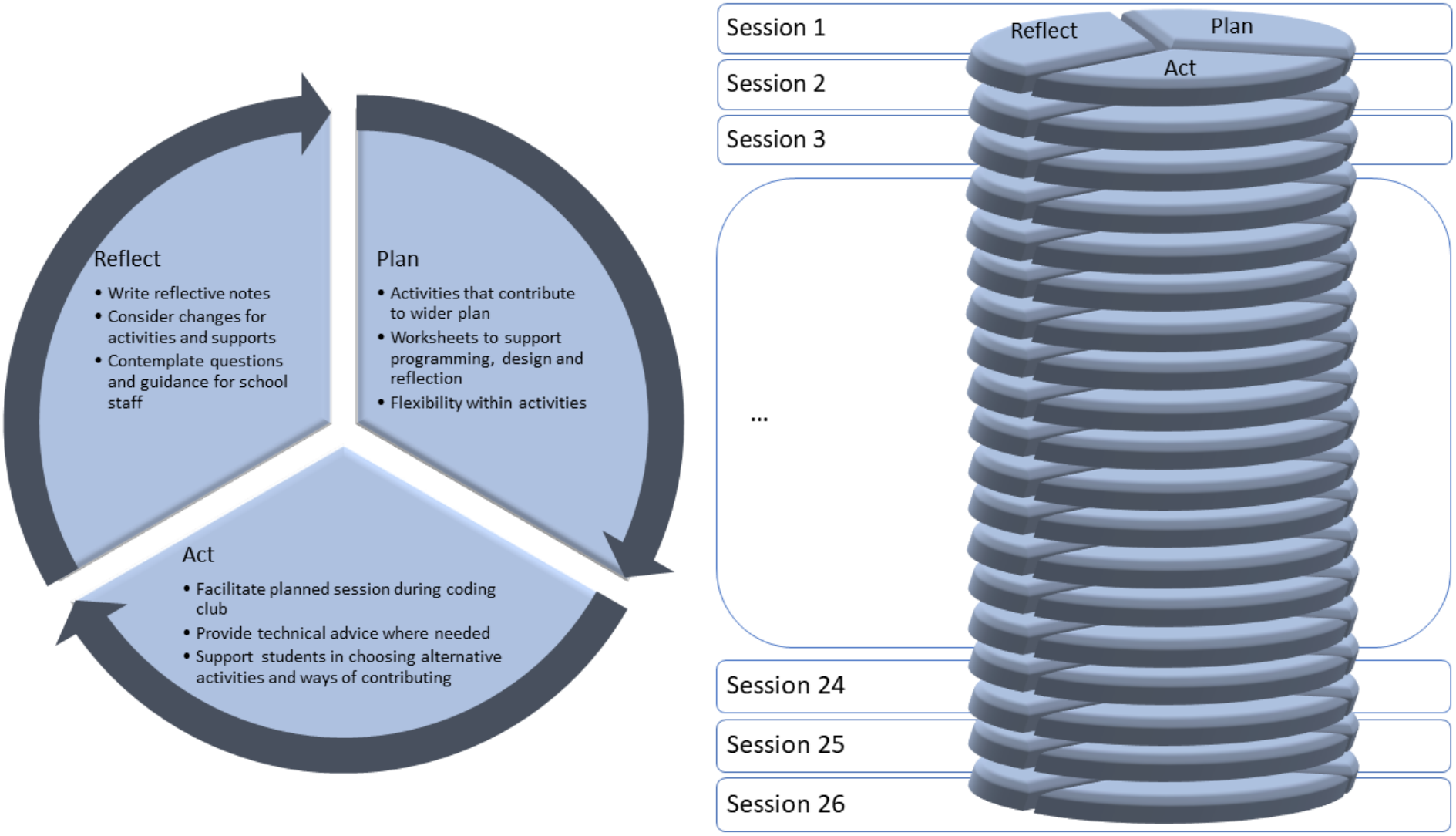


Figure 8-3: Implementation of the participatory action research within the first study

Table 8-1: Schedule of activities

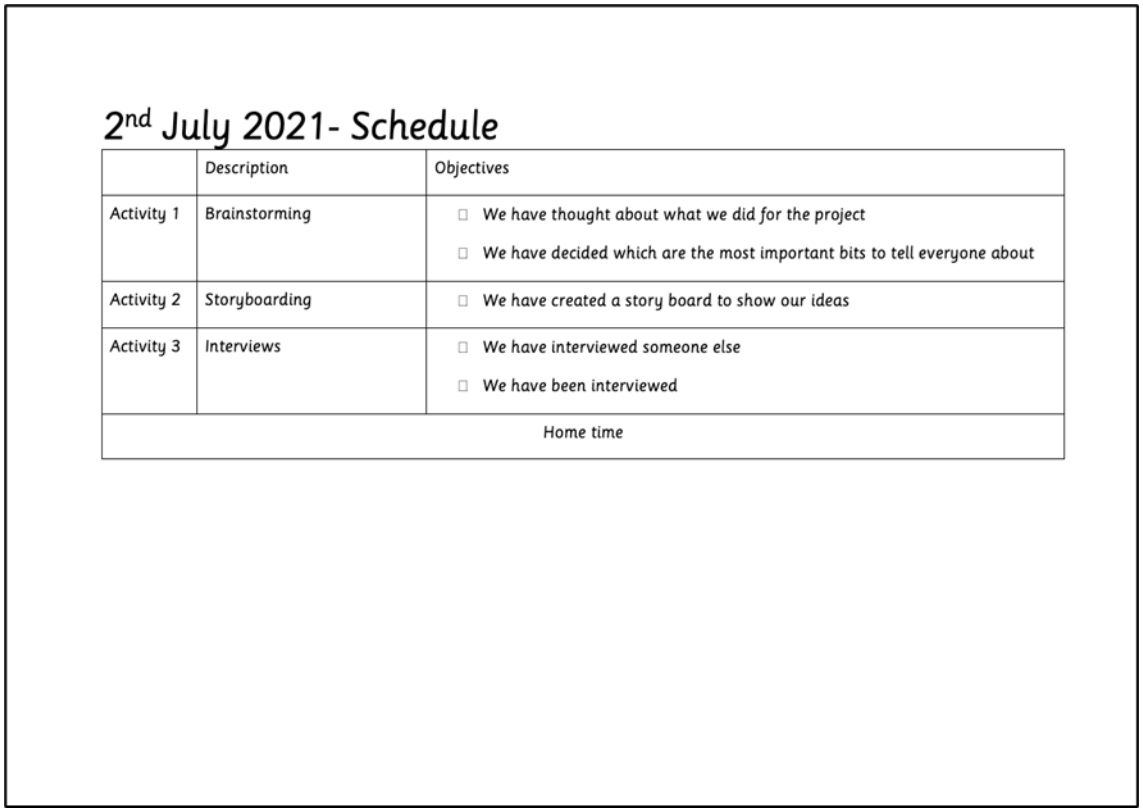
Session Number	Format	Objectives and Activities	Opportunities for learning
1	In-person	Introducing the design problem Developing initial ideas Filming for digital stories	Mutual learning about game ideas through presentational and propositional knowledge sharing Capturing experiential knowledge of the session
2	In-person	Thinking about users, working with personas Fleshing-out initial ideas Filming for digital stories	Mutual learning about game ideas and hypothetical users through presentational and propositional knowledge sharing Capturing experiential knowledge of the session
3	Online	Combining ideas Filming for digital stories	Using presentational and propositional knowledge to describe initial ideas Developing practical knowledge about collaboration and game design Capturing experiential knowledge of the session
4	Online	Planning how to evaluate the game Naming the game Filming for digital stories	Developing practical knowledge about research planning, collaboration and compromise Capturing experiential knowledge of the session
5	Online	Industry guest (1) Giving feedback on our ideas (so far) Filming for digital stories	Mutual learning with industry guest (1) Developing and demonstrating practical knowledge about giving constructive feedback Capturing experiential knowledge of the session
6	Online	Planning how to evaluate the game Searching for and creating graphics Filming for digital stories	Developing practical knowledge of collaborative research Communication of ideas for graphics through presentational and propositional knowledge Capturing experiential knowledge of the session

Session Number	Format	Objectives and Activities	Opportunities for learning
7	Online	Industry guests (2 and 3) Planning how to build the game Filming for digital stories	Mutual learning with industry guests (2 and 3) Using presentational and propositional knowledge to describe initial ideas Developing practical knowledge about planning, collaboration, and compromise Capturing experiential knowledge of the session
8	Online	Starting to code- using sprites Developing game artwork- characters Filming for digital stories	Developing practical knowledge about research planning, collaboration, and compromise Capturing experiential knowledge of the session
9	Online	Coding- adding buttons Developing game art- weapons Filming for digital stories	Developing and demonstrating practical knowledge of coding, and graphics Capturing experiential knowledge of the session
10	In-person	Coding- choosing your character Developing game art- opening screen Filming for digital stories	Developing and demonstrating practical knowledge of coding, and graphics Capturing experiential knowledge of the session
11	In-person	Coding- finishing selection menu Filming for digital stories	Developing and demonstrating practical knowledge of coding Capturing experiential knowledge of the session
12	In-person	Coding- moving character on level 1 Artwork- zombie sprites Filming for digital stories	Developing and demonstrating practical knowledge of coding, and graphics Capturing experiential knowledge of the session
13	In-person	Coding- adding weapons Artwork- checkpoint sprite Filming for digital stories	Developing and demonstrating practical knowledge of coding, and graphics Capturing experiential knowledge of the session
14	In-person	Coding- adding zombies Artwork- hit zombies Filming for digital stories	Developing and demonstrating practical knowledge of coding, and graphics Capturing experiential knowledge of the session

Session Number	Format	Objectives and Activities	Opportunities for learning
15	Hybrid	Online guest (4) Feedback on the game so far Filming for digital stories	Mutual learning with industry guests (4) Developing and demonstrating practical knowledge about giving constructive feedback Capturing experiential knowledge of the session
16	In-person	Coding- adding background music and sound effects Composing original soundtrack for first level Filming for digital stories	Developing and demonstrating practical knowledge of coding, and music composition Capturing experiential knowledge of the session
17	In-person	Coding- adding sound effects Artwork- backgrounds Music for another levels Filming for digital stories	Developing and demonstrating practical knowledge of coding, music composition, and graphics Capturing experiential knowledge of the session
18	In-person	Coding- adding a new level Artwork- end screens, backgrounds Filming for digital stories	Developing and demonstrating practical knowledge of coding and graphics Capturing experiential knowledge of the session
19	In-person	Coding- new level Artwork- backgrounds Music- theme tune Interim game testing Filming for digital stories	Developing and demonstrating practical knowledge of coding, music composition, graphics and game testing Capturing experiential knowledge of the session
20	In-person	Coding- adding background music Music- boss theme Interim game testing Filming for digital stories	Developing and demonstrating practical knowledge of coding, music composition, and game testing Capturing experiential knowledge of the session
21	In-person	Evaluation interviews	Transduction of experiential knowledge to propositional knowledge during interview
22	In-person	Game testing and evaluation survey Evaluation interviews	Demonstrating experiential knowledge of gaming and critical review Transduction of experiential knowledge to propositional knowledge during interview

Session Number	Format	Objectives and Activities	Opportunities for learning
23	In-person	Reflection and planning for creating digital stories Evaluation interviews	Transduction of experiential knowledge to propositional knowledge during interview, and presentational knowledge in plans for digital stories
24	In-person	Planning for digital stories Exploration of footage archive Editing digital stories	Developing practical knowledge about digital story creation, and navigating large footage archive Transduction of experiential knowledge to presentational knowledge in digital story
25	In-person	Editing digital stories	Demonstrating practical knowledge of video editing Transduction of experiential knowledge to presentational knowledge in digital story
26	In-person	Editing digital stories	Demonstrating practical knowledge of video editing Transduction of experiential knowledge to presentational knowledge in digital story

Sessions were structured with each consisting of a set of activities for the students to work through in small groups; initially these groups comprised 3 or 4 students but restrictions due to COVID-19 in January 2021 meant the groups combined to work online via Google Classroom as a single group. This structured approach was informed by Benton et al. (2014) who suggested that structure can improve the predictability of sessions for neurodivergent co-designers, thereby reducing anxiety associated with uncertainty. The structure of each session was presented at the beginning of the session and was included in a schedule on the front page of an accompanying resources booklet (see Figure 8-4 for an example). The format of activities was based around those with which students were familiar, and supplemented by established participatory research activities such as diamond nine and speech bubble based feedback activities (McCabe and Horsley, 2008). Sessions lasted around 90 minutes. A brief overview of the activities of each session and the corresponding opportunities for learning, knowledge co-construction and sharing can be found in Table 8-1. Further example resources can be found in Appendix C.



2nd July 2021- Schedule

	Description	Objectives
Activity 1	Brainstorming	☐ We have thought about what we did for the project ☐ We have decided which are the most important bits to tell everyone about
Activity 2	Storyboarding	☐ We have created a story board to show our ideas
Activity 3	Interviews	☐ We have interviewed someone else ☐ We have been interviewed
Home time		

Figure 8-4: Example schedule provided on the front page of the workbook for coding club (Ward *et al.*, 2022, p. 6)

The design problem to be worked on was developed by the myself and school staff supporting the project and introduced to student co-creators in the first session. The brief was to design a computer game that would incorporate the school's existing e-praise reward system, whereby students are awarded e-praise points when they do well in lessons. Students can then exchange their e-praise points for items from the school's e-praise "shop" such as puzzle-toys and trading cards. The games were intended as a way for students to make use of e-praise points in another way. The brief for the project was intentionally very open to maximise children's agency and contributions. Few restrictions were placed on the limits of the co-creators' contributions, although co-creators were encouraged to think about the feasibility of building certain types of games. For example, one group initially suggested an open exploration game with intricate 3-dimensional graphics which may not have been possible given the time available for the project and the students' programming experience.

Resource packs were provided each week as paper copies, or digitally, as required by each student. The purpose of the worksheets was to provide scaffolding for children's thinking, without constraining them to expressing their ideas in a particular way. This follows recommendations by Millen (2014, chap. 7) relating to both providing scaffolding for open-ended design tasks, and information about the structure of sessions. Students were encouraged to complete the worksheets in the way that best suited them e.g., through

physically writing and drawing on them, by asking someone to scribe for them, or by adding digital imagery such as photographs, pictures from the internet, or digital artwork. This flexibility follows recommendations by Nind (2014b, pp. 52–53) and Bertilsdotter Rosqvist *et al*. (2019) regarding inclusivity of research design. Furthermore, this openness to different forms of expression and contribution reflects the intention to value different ways of knowing about the world, without privileging (linguistically encoded) propositional knowledge over other (creatively expressed) presentational forms of knowledge.

Game development was mostly undertaken by the students, with some support from me and the school staff supporting the coding enrichment sessions. Scaffolding for coding was provided through worksheets to guide students through the technical aspects of creating their game. Student involvement in development aimed to further deepen and demonstrate their practical knowledge, which was initially established during the early stages of the coding club. In addition to the assistance from school staff, students were supported with various stages of design and development by the technology professionals who joined to share their expertise.

When students were joined by guests from the technology sector, sessions started with introductions, and each guest talked about how they use design and programming skills at work. Guests spoke to the group for about 5 minutes at the beginning of the session, and the students asked questions. Following this, the guests participated in the activities planned for the rest of the session, helping to co-produce the work with the students. Speakers had skills relevant to the activities for a given session; for example, a software developer attended (virtually) on the week the group worked on their plan for programming the game. Following discussions with collaborators at school concerning the possible stress to students relating to meeting new people, we only planned to have guests on three different weeks of the project. Students' concerns about meeting new people were reflected through their questions about the project during the information session, with some students needing some reassurance that industry guests would not repeat previous negative experiences of social interactions with unfamiliar people.

8.5 The design artefact "Birds with Guns"

As described in Ward *et al*. (2022), the game students created is called "Birds with Guns". It is a retro-style 2D shooting game, where the players control one of four bird characters to shoot zombie-birds and pass through the levels to win the game. Many of the student co-creators involved in the project were avid gamers, and though the contents of the game may seem a little unconventional, it reflects the student co-creators' choices, tastes, and interests. Much of the artwork for the game was created by students involved in the project, including two of the

player's characters, the zombie-birds (including the effect of being hit), and the backgrounds. Students composed original music for each level and narrated instructions for the game. As such, the game itself is considered the result of the practical knowledge which students already had and further developed in coding; graphics, and music composition; and a reflection of their presentational knowledge about the ideas which were developed through collaborative discussion and ideation in early stages of the project. Figure 8-5 shows a selection of screenshots from the game including custom characters, zombie-birds and backgrounds developed by the student co-creators, a short video of some gameplay can be viewed here.

Figure 8-5: Screenshots "Birds with Guns". Clockwise from top left, they show the opening screen, character menu, and levels two and three respectively (Ward *et al.*, 2022, p. 7).

8.6 The role of digital stories for documenting students' experiences

As described in section 3.4, the focus on digital stories as a means for exploring students' experiences follows on from their early conceptualisation and use in the field of autism research. Parsons *et al*. (2015) argued that digital stories can be a way for unheard voices (autistic children) to capture their own experiences of educational practices through collaborative filming, editing and narrative creation. Parsons *et al*. (2015) maintained that through the generation of digital stories, those authoring them can communicate their own experiences and knowledge, as their choice of what to film and what footage to include in digital stories make explicit their own priorities and sense-making practices. This is particularly

important given the pervasiveness of deficit-focused thinking within autism research more widely (Kapp *et al.*, 2013; Pellicano and den Houting, 2022). Consequently, digital stories also potentially avoid the privileging of researcher perspectives, which more traditional data-collection methods can reinforce, by shifting the focus to a more strength-based model of capturing children's experiences (Lewis-Dagnell, Parsons and Kovshoff, 2023; Parsons *et al.*, 2023). This study pushes the use of digital stories in several ways: firstly, by extending the digital stories methodology to capture and reflect on the process of participation within the study, and secondly, by promoting student co-creators as authors of their own stories.

The process of making the digital stories involved four stages: filming, footage preparation, planning and editing. A comic strip was used to introduce the student co-creators to the idea of digital stories in the first session, along with the protocols for filming (see Figure 8-6). Each week a different student (or sometimes pair of students) took a turn to film for the session. I then prepared the footage for inclusion in the digital stories: trimming long videos into shorter clips, labelling them according to who and what they show, and organising them so they could be easily navigated by the students. Towards the end of the project, student co-creators spent a session reflecting on their involvement, and planning what they wanted to include in their digital stories. I then collated their ideas so that students could use them to build their Stories. Finally, student co-creators worked individually or in pairs to edit together their digital stories by selecting narrative phrases from their collective pool of ideas, combining them with clips from the archive of footage, and using editing software to add music, visual effects and animations.

Student co-creators were involved in decision making on multiple levels while creating the digital stories. Not only did student co-creators choose what to film during coding club sessions, but also how to film it (choosing the equipment and framing). At the editing stage, they chose what clips they wanted to use, and the narrative sentences to use to frame the clips. The digital stories are mostly structured around two types of shot: a series of narrative sentences, presented as (relatively) static slides, interspersed with clips of footage filmed by student co-creators. However, some student co-creators chose to feature text directly overlaid on footage. The process of creating the digital stories included selecting clips from the large catalogue of footage filmed over the course of the first 20 sessions during which the students designed and built the game.

Figure 8-6: Comic strip explaining the creation of digital stories

Almost all the video footage was made available to student co-creators while editing together the digital stories. Only short sections of footage were removed from the archive made available to the students to maintain participant confidentiality and anonymity. For example, I removed a clip filmed before a session began, which depicted a small group of students sat round a computer on Google Street View discussing where a student in the group was due to move in the coming months. Consequently, while the availability of footage for the purposes of making digital stories was not greatly affected, the influence of my interpretation and organisation of this footage, and the scaffolding provided for editing the stories was not neutral. Therefore, while I consider the digital stories to be a strong representation of the student co-creators' experiences and perspectives on their participation, it is also the case that the digital stories were co-created by me.

8.7 Other co-produced data

Though digital stories were employed to explore the experiences of student co-creators in the design process, the project was documented through a variety of other methods as well. I collated design outputs from each session, including students' drawings, digital images, voice recordings and compositions, and produced written observations and reflections after each session. Additionally, student co-creators took part in reflective interviews at the end of the project, which they chose to do in small groups of two or three alongside me. Interviews were semi-structured and based around an interview schedule which we (the students and I) co-produced during earlier coding club sessions. The co-produced interview schedule can be found in Appendix C.8. In order to provide further opportunities for students to practice agency over the evaluative interviews, roles within each interview were negotiated on a case-by-case basis. This flexible approach reflects both my methodological stance, but also research which suggests autistic people feel more able to contribute to conversations when they are comfortable and have a sense of control over the conversation (Silver and Parsons, 2022). Sometimes students chose me to act as interviewer, but in others they chose to interview each other, with me providing support where needed. In most cases where adults were interviewees, student co-creators wanted to be interviewers and so they chose to take turns in asking questions.

8.8 Analysis

As described in section 5.4 ('Multimodal analysis'), I applied a social semiotic multimodal analysis method to the data. As per the previous description, this analysis started from the micro-level transcriptions of the digital stories, and then drew in supporting evidence from the other co-produced data available. In total, four digital stories were created by six student co-creators, although the digital stories featured and drew upon the work of some of the other students as well. The digital stories are briefly described in Table 9-1, Table 9-3, Table 9-5, and Table 9-7, which each represent a much simplified version of the micro-level transcriptions upon which this analysis is based. Where appropriate, these descriptive tables are supported by further figures, depicting particular shots and the distribution of modes. To support the navigation of my analysis for those using screen-readers, visual and textual data are intentionally separated. The first two stages of analysis for each story are prefaced by a brief introduction to the student co-creators who developed them, and some background information about how these students were involved in the study. The first digital story and related analysis were originally presented within Ward *et al*. (2022).

The first stage of analysis (reported in sections 9.1.1, 9.2.1, 9.3.1 and 9.4) focused on the individual modes employed within each of the digital stories, and the opportunities and limitations which each mode provided as a semiotic resource. For this first stage of analysis, I focus on the surface-level meaning and content of the digital stories. Within the digital stories I identified 11 modes through which the student co-creators could encode meaning. These modes were then coded individually for the meanings which the students chose to embed within each mode. The second stage of analysis (reported in 9.1.2, 9.2.2, 9.3.2 and 9.4.2) examined the higher-level meanings which might be inferred from how modes are combined in the digital story as a multimodal artefact. The composition of the digital stories can be roughly divided into two types of shot: the composition of the narrative slides, and the video clips overlaid with music, animations, and sound effects. This section explores the meanings created through the design of both these types of shot, and how they combine to create wider-level meanings.

I then turn to take a slightly wider perspective which spans the four Stories to present the final two stages of analysis. The third stage of analysis (reported in 9.5) compares the sign-makers and context of meaning making for each of the digital stories. This involves a discussion of the meanings which can be inferred from the selection of one clip over another, and how this is related to the choices of student co-creators as sign-makers. I discuss the importance of the sign-makers and the context of sign-making by drawing upon the experiences of the wider group, relating and triangulating the conclusions from the digital stories to other sources of data, including the co-produced interviews and outputs from design. Finally, in section 9.6, I explore the links between the findings presented here, and some key concepts and theories. Specifically, I examine learning within the participatory design process (in section 9.6.1); students' sense of agency and experiences of participation (in 9.6.2); and the opportunities for voice within digital stories as a multimodal method of data collection (in 9.6.3).

9 What we found: results and discussion

9.1 Jay and Terry

As described in Ward *et al*. (2022), Jay[2] and Terry are good friends. They chose coding as their enrichment activity for the 2020-2021 academic year. They were involved as student co-creators from the outset and contributed to the initial ideas for the game. However, their participation

[2] To protect the students' anonymity, these are pseudonyms. All names given for students within this thesis are pseudonyms.

was interrupted by COVID-19 restrictions which limited face-to-face teaching. They were, therefore, unable to join several the sessions when the initial ideas were merged to produce the single design that would become “Birds with Guns” as it is presented here and in Ward *et al*. (2022). At the point when Jay and Terry returned to coding club, we had started coding the game controls. Jay and Terry contributed to these sessions in several ways: they further developed the game idea, adding the new element of zombie-birds falling from the sky, implemented their idea, programmed other game elements, performed formative game-testing, and co-created their digital story. A brief overview of the contents of their digital story is shown in Table 9-1, with further images shown later in Figure 9-2.

Table 9-1: Overview of Jay and Terry's digital story as described in Ward *et al*. (2022, p. 9)

Shot number	**Start time**	**Shot type**	**Description**
1	00:00	Narrative slide	Text reads: “we made a game with fuze”. The music starts with a percussive rattle before continuing into an upbeat rhythmic riff.
2	00:03	Student footage	The music continues, we hear the researcher and students chatting. The camera looks towards the car park, through the windows to the back of the classroom and some blinds. The cars in the carpark are in focus. After a few seconds an explosion animation and sound effect is overlaid on the centre of the shot.
3	00:20	Narrative slide	Text reads: “We remember when [name redacted] first drew his idea”.
4	00:23	Student footage	The camera focuses on a pile of small hand-held whiteboards on a desk. The student, who is holding the camera, chats with the researcher who is next to him, about the drawings on each of the whiteboards, explaining his ideas. The music comes to an end as he describes his first idea.
5	1:14	Narrative slide	Text reads: “I copied the code from paper onto Fuze”
6	1:17	Student Footage	The footage shows two computers on a desk to the left of the frame, against a plain off-white wall. In the bottom

Shot number	Start time	Shot type	Description
			corner we see the torso of a child, in a sweater and jogging bottoms. There is a sheet of paper on the desk in front of the keyboard. The student fiddles with it. We hear the researcher and the teacher talking to some students. An explosion effect is overlaid on the computer screen that the student is using. Another animation indicating the footage is LIVE as if on 24-hour news is in the bottom left corner. The animations are accompanied by sound effects.
7	1:20	Narrative Slide	Text reads: “We drew characters created different characters in the game”.
8	1:23	Student footage	The student filming explores the classroom with the camera, while other students work on their chosen activities. It moves about unsteadily, passing groups of students working on coding, and music before settling on a student working on some artwork on a laptop. The student filming asks what the other student is doing, he turns to look at the camera and responds that he is “doing a bird”.
9	2:35	Narrative Slide	Text reads: “The End”
10	2:38	Student Footage	A student stands in front of camera, presenting facts about coding charismatically. Another student comes into shot and corrects his understanding of the word binary. The pair field heckles from another student out of shot, who criticises what they are doing. The first student focuses his attention on the camera again and signs off “see ya later, and that’s my fact”.
11	4:18	Narrative Slide	Text reads: “made by [name redacted] and [name redacted] Helpers: [name redacted] and [name redacted]”

9.1.1 Modes

The cross-referencing of modes and meanings within Jay and Terry’s digital story is depicted in Figure 9-1 from Ward *et al*. (2022, p. 10). This Figure shows the wide variety of modes which they

draw upon to communicate their experiences of participatory design within the coding club. In particular, it is interesting to note how they made use of the semiotic resources available to them to capture their experiences. They both made use of their immediate environment, and concocted video for the purposes of the digital story. For example, they included footage of the carpark outside the classroom, filmed from within (shot 2), presented interactions staged for the purpose of the digital story (shot 8), as well as more documentary footage of the coding club (shot 10). Similarly, they made use of both free-hand and tripod-controlled filming, which each contributed to different aspects of communicating their experiences. Though students had not been given detailed or prescriptive instructions for filming, these additional filming practices extended beyond simple documentation of the groups' experiences. Jay and Terry took control of filming for the digital stories and chose to do it in their own way.

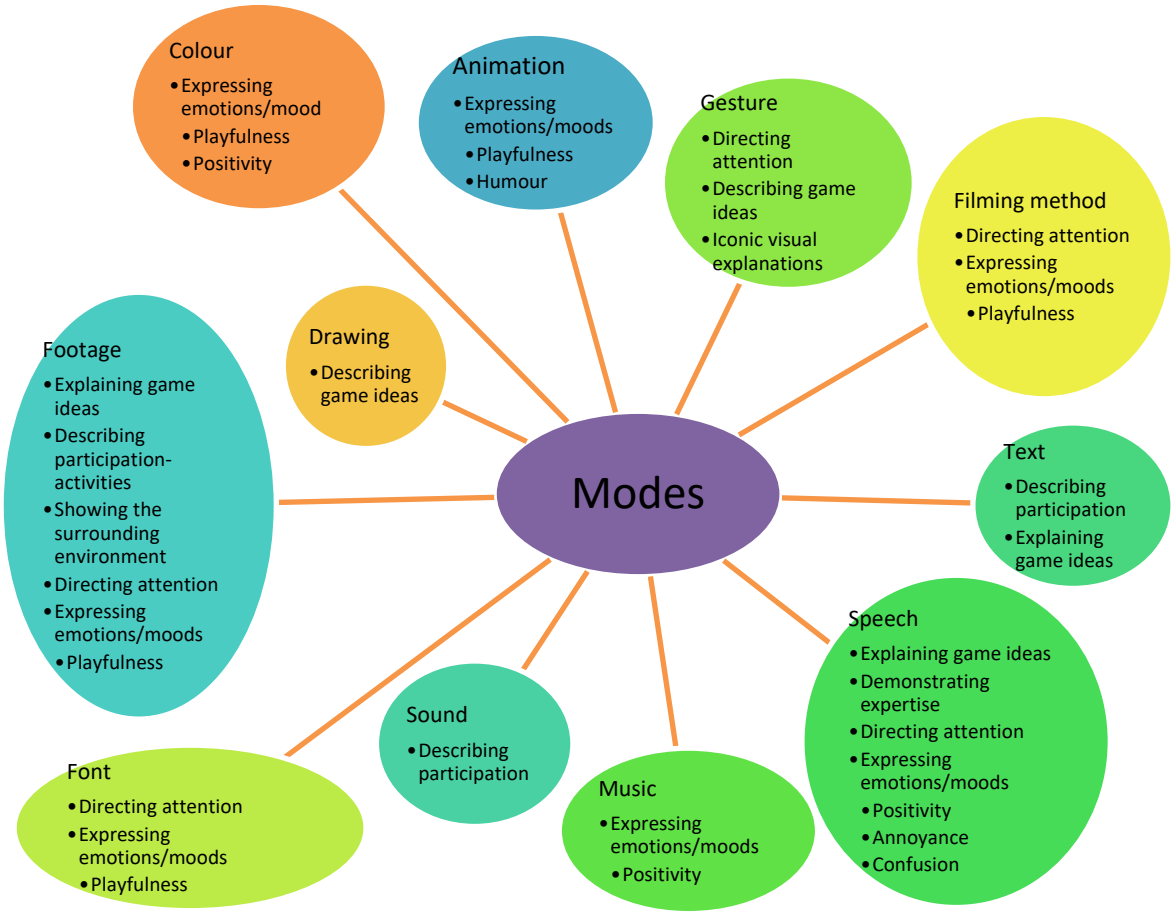


Figure 9-1: Diagram showing use of individual modes in Jay and Terry's digital story about making the game 'Birds with Guns' (Ward *et al.*, 2022, p. 10)

9.1.2 Composition

Jay and Terry chose to include both narrative slides, which contained text about their experiences, and their own footage. The distribution of the different modes across each shot type is shown in Table 9-2. Some modes are employed across both the narrative slides and the

student footage, such as text, animation and music. This reflects the constraints of each type of shot as a multimodal artefact, however it also reflects the students' creativity and agency as sign-makers.

Table 9-2: Distribution of modes across shots in Jay and Terry's digital story (Ward *et al.*, 2022, p. 11)

Shot type	**Shot Numbers**	**Modes employed**
Narrative slides	1, 3, 5, 7, 9, 11	Font, colour, text, music, animation
Student Footage	2, 4, 6, 8, 10	Footage, sound, music, animation, filming method, speech, gesture, drawing, text

Within the narrative slides, the text describes the ways students actively participated in the project, whereas the other modes, namely font, colours and music, contribute to the emotional impression which the video evokes for the viewer. The text refers to both repeated activities (i.e. the act of programming- "copying code" in shot 5) and personal highlights for co-creators, for instance drawing ideas (shot 3). As shown in Figure 9-2, the brightly coloured slides and thick fonts upon which the narrative sentences describing the activities sit reflect the student co-creators' sense of fun and enjoyment of their experiences. The accompanying music begins with a percussive rattle and continues with an upbeat rhythmic riff, further contributes to the positive and energetic tone. As noted in Ward *et al*. (2022), student co-creators consistently convey this joyful, positive tone within the narrative slides, even when the descriptions featured are more neutral. For example, the text for shot 5 describes "copying code", which is an otherwise unemotional description of their coding activity, yet the colours and font within the slide reflect the students' more positive attitude towards their experience (Ward *et al.*, 2022).

In contrast, the final two narrative slides appear to draw upon popular cultural references for a somewhat different purpose. The delicate, curly white font and greenish-blue background of the penultimate slide evokes a fairy tale; it is used structurally to mark the end of the descriptive story element of the video. The final slide follows a similar colour scheme, but the font becomes simpler and easier to read. Jay and Terry are credited as the authors of the digital story, and the text further acknowledges the contributions of me and another student. This final text emphasises the importance of doing the project together and recognizing what each person has added (Ward *et al.*, 2022).

Figure 9-2: Narrative slides used in Jay and Terry's digital story in shots 1, 3, 5, 7, 9, and 11 (respectively from top left to bottom right) (Ward *et al.*, 2022, p. 11)

The sections of footage reflected similar choices in relation to the multimodal composition and distribution of meanings across modes. The video clips depicted what the students did during coding club sessions, while the music and overlaid animations created a more playful tone. For example, the "LIVE" sign and explosion overlaid in shot 6 evoke the drama of television news coverage compared with the less dynamic, low-energy footage of a student working at a computer (Ward *et al.*, 2022). However, shot 8, which features footage from student co-creators as they move around the classroom exploring and observing other students' participation is not enhanced through additional effects (Ward *et al.*, 2022). Furthermore, shot 10 depicting the two students talking about coding does not directly depict the activities students engaged with while developing "Birds with Guns" at all (Ward *et al.*, 2022).

Although there is some coherence within the narrative created by the descriptive text and corresponding video, this is not consistent throughout Jay and Terry's digital story. For instance, shots 1 and 2 do not appear to link coherently. Shot 1 is a narrative slide which provides introduction and context for the digital story: "we made a game using fuze", whereas shot 2 consists of an explosion animation superimposed over footage of the car park (Ward *et al.*,

2022). Whereas the footage chosen for shots 4 and 6 depicting students within coding sessions working on computers, developing artwork and explaining their ideas more closely align with the textual descriptions of student activities and experiences in the corresponding narrative slides (shots 3 and 5 respectively) (Ward *et al.*, 2022). The meaning suggested by these mismatches are explored further in 9.5.

9.2 Andy and Tim

Like Jay and Terry, Andy and Tim were involved in the study from the beginning, having chosen to do coding for their extra-curricular enrichment, and Andy's involvement was interrupted due to school closures and COVID-19 restrictions. However, Tim was one of the few students whose engagement was not affected. In fact, he did not miss a single session during the whole period of data collection. Tim seemed to really enjoy the project, taking part in idea generation, game development, coding the game, creating the digital stories, and co-producing interviews with key adults who had supported the group along the way. In particular, he loved coding, and regularly needed several reminders that it was nearly the end of the session before logging off from his computer. Andy took part in a similar selection of activities but had a smaller influence on the design of the game, due to the disruption to his involvement as a result of COVID-19. While Andy chose to do the coding activities, he often required more support to do them, but was good at requesting support when required. Though Andy and Tim were friendly, they were not friends to the same extent that Jay and Terry were. I suggested they work together on their digital story, and they proved to be a successful team, creating a digital story which reflected their involvement in the project and their views on the game. A summary of the contents of Andy and Tim's digital story is given below in Table 9-3, further images from their Story are given in Figure 9-4.

Table 9-3: Summary of Andy and Tim's digital story

Shot number	**Start time**	**Shot type**	**Description**
1	00:00	Text over footage	Text reads: "We drew our ideas". It appears over footage of a student coding at a computer, with a teacher next to them supporting. The text is yellow and black, with a red and blue colour filter over the background footage.
2	00:01	Text over footage	Text reads: "[name redacted] did the voice acting", in pixelated white writing over a purple text box, it disappears after a few seconds. Music starts, a bassy

Shot number	Start time	Shot type	Description
			rhythmic rock track. The camera shows a student exploring with google maps, as the person filming asks “What’s China?”, then the camera moves, exploring the room and showing other groups of students sat in pairs, working on coding, it hovers on each before moving on to the next group.
3	00:46	Narrative text	Text reads: “ the game is quite interesting but weird at the same time”, in thick lime green writing over a black text box. In the background we see the same blue and red filter as before, over a shot of a students’ laptop during an online session, the footage is quite static.
4	00:51	Student footage	A long clip captures the students as they discuss what they could call the game, we hear their voices around the classroom, and see the student being filmed google several ideas, becoming increasingly exasperated as each of them already exists as something else. We see another student, and a member of staff come over to support him as he searches. The music continues in the background.
5	06:09	Text over footage	Text reads: “we added more levels and more zombie birds” in white writing over a yellow and orange speckled splodge. The footage behind shows the backs of some students, then quickly pans up to the classroom ceiling, wooden beams and lights.
6	06:10	Text over footage	Text reads: “you can get trigger happy the ammo is infinite” in yellow Simpson-like writing. The footage behind shows two students sat at computers coding intently, one has headphones on.
7	06:14	Narrative text	Text reads: “the end of coding to make the games” in black writing on top of colourful squares of yellow, orange, pink and blue. The music stops with two final chords and cymbals.

Shot number	Start time	Shot type	Description
8	06:15	Student footage	We see the back of the classroom, including the green carpet and the chair. The camera moves unsteadily towards the windows at the back. We hear the noises of the classroom, and the voice of the student filming. It all stops abruptly.

9.2.1 Modes

The results of cross-referencing the modes and meanings for Andy and Tim's digital story are shown in Figure 9-3. In contrast to Jay and Terry's digital story, we do not see any use of drawing to communicate game ideas, nor do we see any use of animation outside of the transitions of text onto and off the screen. In that sense, this digital story does not appear to explore all the available semiotic resources to the same extent. Nevertheless, it does appear to take a wider view with respect to the depiction and documentation of student co-creators' experiences. In keeping with Tim's experiences, there is footage of an online session which Tim joined from school (shots 4 and 5). However, the narrative phrases draw upon the actions and experiences of students other than Andy and Tim; notably the phrases chosen for inclusion on shots 2 and 6 refer to other people's experiences and opinions about the game. This wider perspective is emphasised by the choice to communicate and demonstrate the importance of relationships, which is reflected in the meaning "showing relationships" which is signified through their use of footage, speech, filming method and sounds. Andy and Tim included footage relating to the key relationships formed and strengthened through the project, especially in clips 2 and 4 which show student co-creators collaborating in small groups and supporting each other.

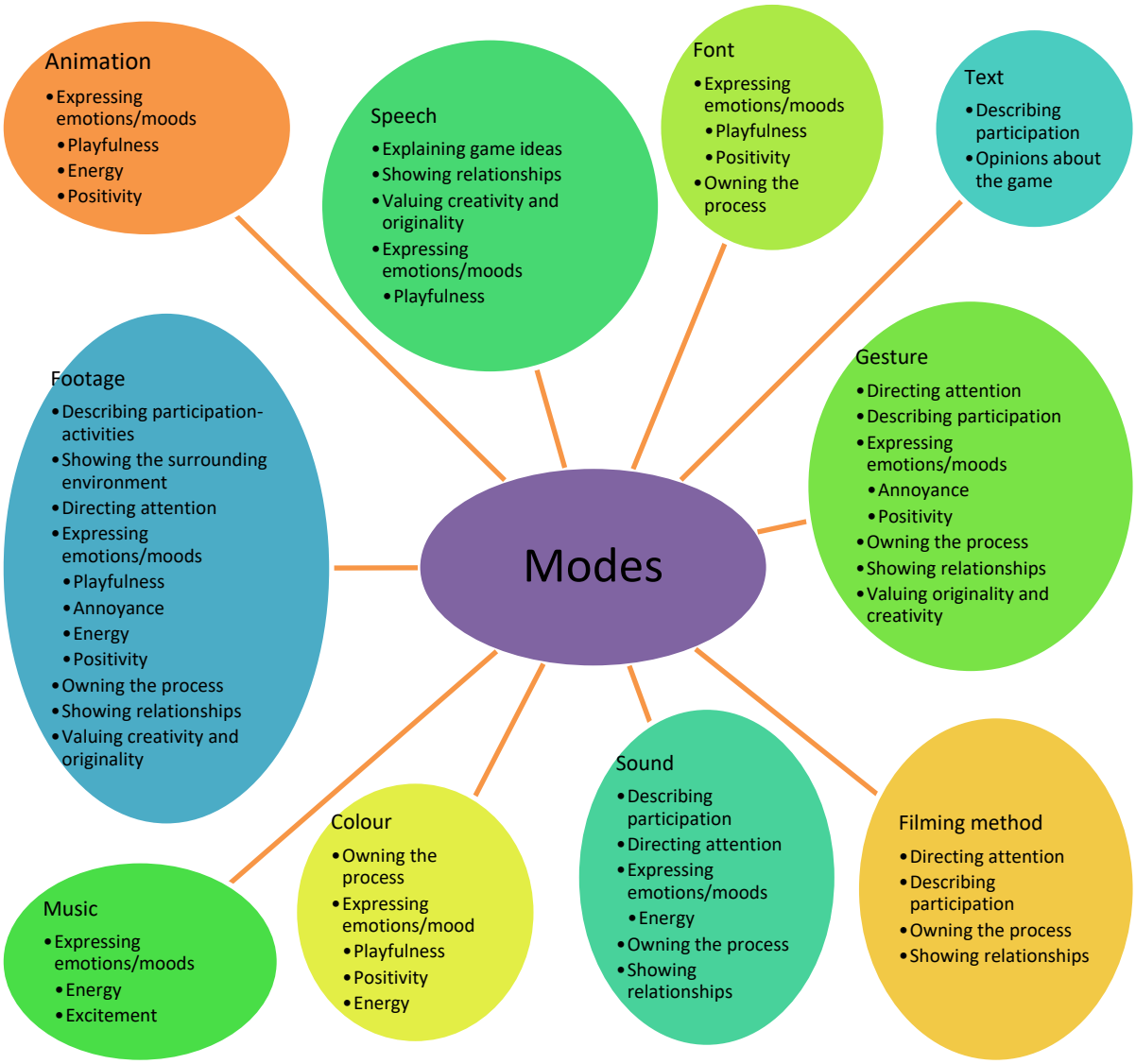


Figure 9-3: Diagram showing use of individual modes in Andy and Tim's digital story about making the game 'Birds with Guns'

9.2.2 Composition

In contrast to Jay and Terry's digital story, Andy and Tim chose to step away from a clear distinction between narrative slides and footage. As described in Table 9-3 and Table 9-4, they instead chose to include several shots which feature text overlaid on footage, rather than on plain, static backgrounds. As such, the result of combining sound and speech alongside the narrative phrases is more pronounced. For example, in shot 2, the text reads "[name redacted] did the voice acting", while the audio from the footage features a student asking a question to the other student sat next to him using the computer. Consequently, although they do not include a direct recording of the voice-over, they achieve a similar effect through the inclusion of a clip which features a disembodied voice (of Tim behind the camera) as he talks to the student featured.

Table 9-4: Distribution of modes across shots in Andy and Tim's digital story

Shot type	**Shot Numbers**	**Modes employed**
Narrative slides	7	Font, colour, text, music, animation
Text over footage	1, 2, 3, 5, 6	Footage, font, colour, text, music, animation, filming method, sound, speech
Student Footage	4, 8	Footage, sound, music, filming method, speech, gesture, text

Figure 9-4 shows stills from Andy and Tim's digital stories, which include the narrative phrases they have used as the structure of their Story. Within the narrative phrases, we see more emotive language reflecting students' feelings and impressions of the game (in shots 3 and 6) interspersed between the more neutral descriptors of game development. Once again, this text is generally in bright, playful fonts. In particular, the blue and red filter applied to the background footage on shots 1 and 3 gives a more dynamic feel, which is emphasised by the contrasting oranges and yellows in shots 5, 6 and 7. The feeling of energy and excitement is furthered by Andy and Tim's choice of music, which is a bass and drum-heavy rock track featuring a signature rhythmic riff. Here we see the accumulation of meaning across several modes, amplifying the positivity and excitement conveyed by the digital story as a whole. There is also a clearer interplay between music, speech and sound in Andy and Tim's digital story, whereby the volume and energy of the background music renders some of the speech and background noises of the classroom inaudible. In doing so, Andy and Tim prioritise the energy and dynamism of the music, which communicates the joy and excitement they experienced while doing the project.

In relation to the incorporations of wider experiences and opinions, the combinations of narrative phrases and choices of clip also serve to acknowledge the sources of those phrases to some extent, even where those opinions are perhaps shared with the digital story creators. For example, one of the students in the footage is the source of the narrative phrase chosen for shot 6, however Andy also commented repeatedly on the pleasure he felt from the sound effect of the gun firing continually, this is something I reflected on in my notes from one of the sessions:

> Andy clearly really enjoyed adding in the music, and seemed to enjoy the auditory aspects of the game, including the repetitive gunshot sound. This is something he has shown great enjoyment in every week.
>
> **—Researcher reflection**

By building upon the narrative phrases generated by the whole group, Andy and Tim were able to highlight aspects of their experience which might have otherwise been missed if they had been relying on only the phrases they had produced themselves.

Figure 9-4: Narrative phrases from Andy and Tim's digital story (shots 1, 2, 3, 5, 6, and 7 respectively)

9.3 Connor

As with all the student co-creators discussed so far, Connor chose to do coding as his enrichment activity from the beginning of the 2020/2021 academic year. Like Tim, he was involved throughout the project, despite the effect of COVID-19. Though he chose to engage in the coding-based activities on some days, on others he chose art-based activities, and a few times he decided not to engage in the activities I had planned at all, instead choosing to follow his own interests or engage with others. As the project progressed the frequency with which he chose not to participate in planned activities increased, and so I was surprised that he chose to develop a digital story when offered the opportunity. Despite being involved in the project for the

duration, he only filmed on one occasion. Connor's digital story makes use of footage from that session. A summary of his digital story is shown in Table 9-5.

Table 9-5: Overview of Connor's digital story

Shot number	**Start time**	**Shot type**	**Description**
1	00:00	Text over footage	Text reads: "[name redacted]" in white pixelated lettering over a purple text box, it disappears after a few seconds. Connor narrates as he zooms into the adult's face, his voice is distorted. An explosion effect is overlaid on the adult's face, and a "24" symbol appears as if from a news broadcast. When the animations disappear, the camera darts away and the remaining three minutes follow Connor and the student next to him as they play, using their hands as would-be puppets, voicing a story. At times the camera moves significantly, mimicking the arc of an aircraft which takes off and then crashes to the floor. At the ends, we hear Connor suggesting to the student next to him that they watch it back, before the clip stops abruptly.

9.3.1 Modes

The results of cross-referencing the modes and meanings for Connor's digital story are shown in Figure 9-5. Unlike the digital stories discussed earlier, Connor's story makes use of a single video clip, with text added over the beginning. Rather than showing the experience of being involved over the course of the project, his story instead documents a single moment, and the connections and activities occurring in that moment. Consequently, I note that he appears not to show such a nuanced picture of the emotional side of his experiences. Similarly, the breadth of meanings encoded across the digital story is comparatively small.

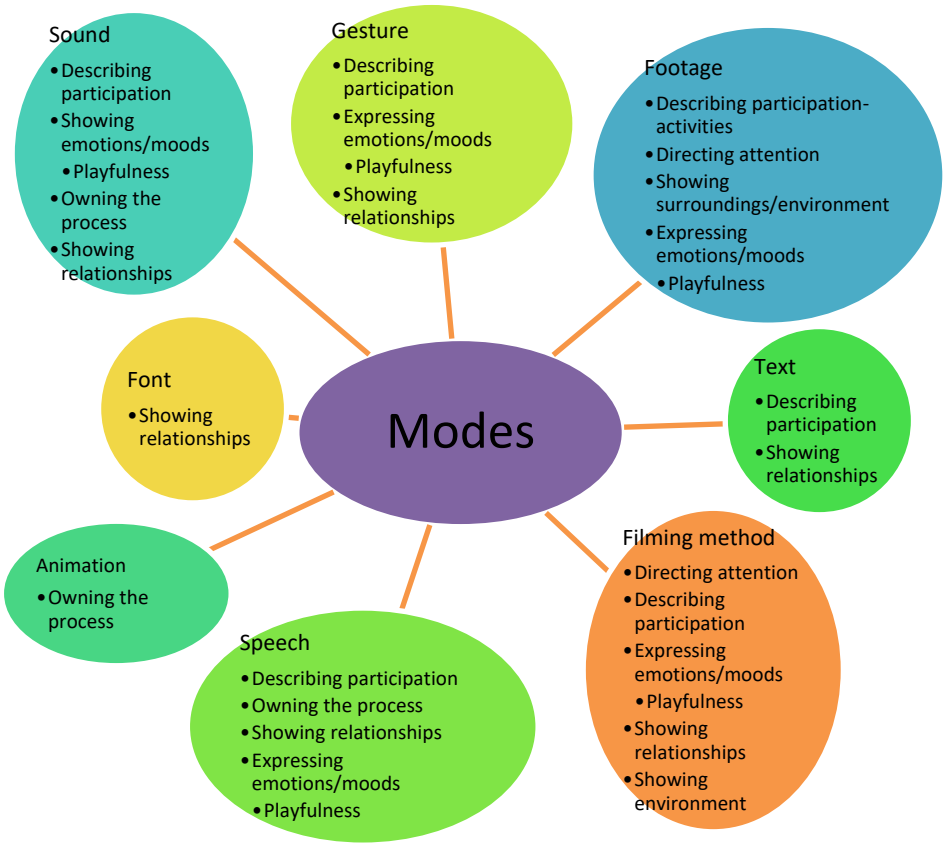


Figure 9-5: Diagram showing use of individual modes in Connor's digital story about making the game 'Birds with Guns'

As in Jay and Terry's Story, Connor takes a playful approach to his use of modes. In addition to the animation for the transition of text on and off the screen, he took advantage of some of the animations available to him within the video editing software. Similarly, we see Connor explore the classroom through the camera, as he moves it to capture his playful interaction with the student next to him. He appears to take a more exploratory approach to filming methods, whereby the dynamic movement of the camera and his interaction with it becomes a mediator of his experience in the classroom. This is reflected in his suggestion to review the clip with the student next to him which we hear towards the end of the story.

Unlike the previous examples of digital stories, Connor chooses not to make use of any music. Instead, we see the prioritisation of speech and ambient sounds, although these auditory modes are affected by the application of a filter which warps and distorts the sound. The application of this filter reflects his playful exploration of the tools available to him within the video editor. However, it did make some aspects of transcribing the auditory modes more difficult, as some of the speech is challenging to make out now that the filter has been applied.

9.3.2 Composition

Connor's digital story makes use of a single clip of footage, with only one instance of overlaid text. A summary of his use of modes for this clip can be found in Table 9-6. Unlike others' use of text, he does not describe activities related to involvement, instead he uses the text to name the member of staff supporting his group as they work. The coordination of the text and the gradual zoom of the camera so the staff member fills the frame instead reinforces the importance of the relationships within the classroom and emphasises the extent to which such relationships shape students' experiences. Though Connor later overlays animations on the footage of the staff member's face, the inclusion and prolonged focus on this adult demonstrates his significant influence on Connor's experience of the study, and within the classroom more widely. Screenshots showing the placement of text and animation over the staff member's face can be seen in Figure 9-6 below.

Table 9-6: Distribution across types of shot in Connor's digital story

Shot type	**Shot Numbers**	**Modes employed**
Text over footage	1	Footage, font, text, animation, filming method, sound, speech, gesture

The centrality of relationships to Connor' experiences are further demonstrated through the focus on the interaction between him, as he films, and the student sat next to him. The footage captures their imaginative play, with the gestures revealing a developing narrative between their hand-puppet characters (this is shown in one of the stills in Figure 9-6). However, it remains unclear regarding how related this play was to the other activities occurring in the classroom at the time. The other students were working together in groups to develop their initial ideas for their games, and so it is possible this play was a way of developing those ideas, however it may also be unrelated. When I reviewed the Story with both the student co-creators they could not remember. The uncertainty of the purpose of this play, along with the lack of explicit description of the ongoing activities or any of the activities which the project involved more widely is itself telling. For Connor, the nature of the study as research rather than a regular lesson allowed for a sense of play and the opportunity for non-participation which was simply not possible in other school contexts, this is a theme which I will pick up on in the final section of my analysis.

Figure 9-6: Still images showing taken from Connor's digital story

9.4 Sophie

Unlike the previous students, Sophie joined the project during the second round of recruitment, due to the interruptions to regular schooling caused by the COVID-19 lockdown in January 2021. While she was involved, sessions were mainly online or hybrid, with only a few held fully in-person before she chose to go back to her regular enrichment session. During one of these sessions, she decided she wanted to take on the role of filming, having seen several of her peers do it on previous weeks. Despite having returned to her usual enrichment session instead of coding, at the end of the project she also decided she wanted to join us in making a digital story using some of the footage she filmed during one session. An overview of Sophie's digital story is given in Table 9-7, with further images depicted in Figure 9-8.

Table 9-7: Summary of Sophie's digital story

Shot number	Start time	Shot type	Description
1	00:00	Narrative text	Text reads: "This is me filming coding", in white pixelated font on a purple text box and black background. There is no sound or background music.
2	00:03	Text over footage.	Text reads: "This is [name redacted] on the computer" in the same font as before. Two students sit to computers in front of a blue board covered in educational posters,

Shot number	Start time	Shot type	Description
			the classroom is noisy. We hear the teacher call the class to quiet, and then she talks with me, as they work out that the coding software has been uninstalled while the computers were updated over the holidays.
3	00:40	Text over footage	Text reads: "This is the whole of [class name redacted] working on the computers" in the same white pixelated font. The footage shows a group of three students sat round desks which have been pushed together. Two are working, while the other talks to them and the teacher, he complains about being bored. The camera pans to show other students, one is doing artwork in the middle of the room and two more are being supported by the researcher on desks against the wall. We hear discussions about which computers the software has been reinstalled on, and where it is still missing, and complaints about the heat.
4	3:31	Text over footage	Text reads: "Me being silly when [name redacted] was burning hot" in the same font. We see the same three students on the desks in the middle of the room. They joke about being in hell. A TA suggests that the student complaining of the heat goes and to sit in front of the fan. The group starts to sing "some body once told me, the world is gonna roll me…". The student complaining of the heat walks past the camera towards the door, and Sophie, who is filming follows him. The story ends abruptly as she leaves the shot.

9.4.1 Modes

The cross-referencing of modes and meanings captured within Sophie's digital story are shown below in Figure 9-7. Although Sophie had access to all the footage filmed by the other student co-creators, she chose to only use her own footage, filmed during the only session she was in control of the camera. Her digital story represents a more in-depth depiction of the events of that session, rather than telling a wider overarching narrative about her participation in the

project over the time she was involved. Consequently, the surface-level meanings communicated by her story are slightly more limited than some of the other stories discussed above.

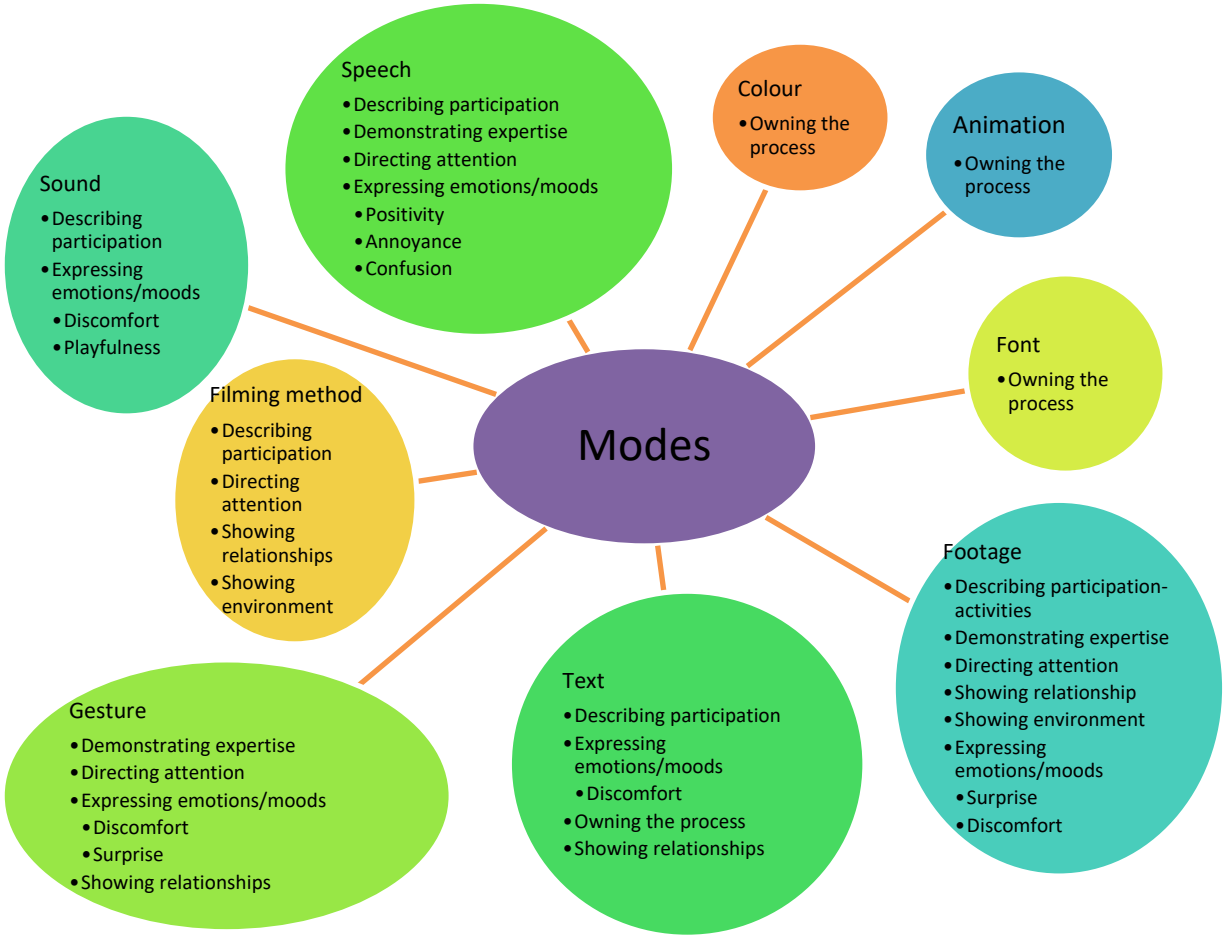


Figure 9-7: Diagram showing use of individual modes in Sophie's digital story about making the game 'Birds with Guns'

In contrast to others' digital stories, Sophie's digital story is unique in that she was the only student to use the same colour, font, and transition animations for each of the narrative phrases in her digital story (shown below in Figure 9-8). Rather than choosing fonts and colours which reflect the emotional quality of the phrases, her selection of a simple, pixelated font reflects the fonts within the software students used to program the game. However, the consistency of this gives a much greater sense of ownership over her decision making.

The shots she selected for inclusion in her digital story all used the same filming method: making use of a tripod with steady panning to explore different areas of the classroom. This approach effectively captures the overall environment and activity which are ongoing in the classroom, and reflects the way she chooses to engage in filming as both a documentary maker, guiding our eye round the classroom, and as an active member of the group. The only sound and speech are that captured through the footage, no music or sound effects are added.

The emphasis of her position in relation to her peers is emphasised in her selection of narrative phrases, which refer more directly to her actions and contributions to the session as it unfolds. Rather than selecting from the sheet of collated narrative phrases, Sophie chose to write her own which drew more directly upon her experiences of filming. The use of first-person pronouns actively position her as narrator of her story, emphasising her role and experiences as the storyteller. By directly naming the group and particular members of it, she also emphasises her position within it.

9.4.2 Composition

Sophie chose to use a single narrative slide, followed by footage overlaid with further narrative phrases. The distribution of modes across these shots is shown in Table 9-8, stills from the digital story showing her chosen narrative phrases are also shown in Figure 9-8. Interestingly, Sophie starts with a narrative slide which serves to introduce what follows as her own work: “This is me filming coding”. This is immediately followed by a clip of footage with text overlaid, where the text gives more context about what is depicted in the footage. This combination of footage with informative text continues for the rest of the video, showing the duality in meaning between what is observed in the footage and what it means to Sophie, as described in the text. In doing so, the text serves to highlight what is important about each of the clips which follow it, according to Sophie’s priorities and interests.

Table 9-8: Distribution of modes across shot types in Sophie's digital story

Shot type	**Shot Numbers**	**Modes employed**
Narrative Text	1	Font, colour, animation
Text over footage	2, 3, 4	Footage, font, text, animation, colour, filming method, sound, speech, gesture

Figure 9-8: Narrative text from Sophie's digital story

By combining text and footage like this, Sophie exemplifies the tension that can arise from student co-creators acting as narrators of their own Stories. Sophie's digital story shows this tension between observation and positionality through the juxtaposition of footage of ambient experiences of others in the classroom, which appear more "objective" or observational, alongside the narrative phrases and text, which more actively position her with and alongside her peers. In doing so, the composition emphasises her relationship to others, once again reflecting the extent to which the relationships between those participating markedly shape student co-creators' experiences of the project. This may particularly be the case for Sophie, who only engaged with the project for a short while during a period which was otherwise affected by COVID-19 related restrictions on social activity and mixing in school.

9.5 Sign-makers and context

Having considered each of the four digital stories as multimodal artefacts individually, I turn to what can be learned from them when considered together. Specifically, I consider how they reflect the experiences and priorities of their creators, and how these tie-in with the experiences of other student co-creators and adult participants, as told through co-produced interviews, design outputs and my own researcher reflections. To do this, I draw on several key factors relating to the student co-creators as sign-makers and the context which are relevant to our understanding of the digital stories, and these factors are discussed in turn through the following sections.

9.5.1 The value in choosing how to participate

Perhaps one of the most important aspects of students' experiences which the digital stories highlight is the value student co-creators assign to choosing how they wished to participate in the project. This is demonstrated across all the digital stories, both in terms of how student co-creators chose to construct their Stories in terms of their structure and focus, and the content they chose to include. Each of the digital stories also shows how student co-creators engaged with different activities within a single session. In both Sophie's and Terry and Jay's digital stories, as the camera pans and explores the classroom we see students doing coding, and working on graphics within the same classroom. In Andy and Tim's digital story we see students working in pairs, doing coding tasks and developing music. Equally in Connor's digital story we see students choosing not to participate in the intended way, but rather choosing to use the space which the project allowed to engage with each other more playfully.

Furthermore, students' choices about how they wanted to participate was evidenced in their interview data, and through the outputs from particular design activities. For example, one student said when describing how he had engaged in the project:

> And, um... I make... I... I helped with some code and I made some of the music, helped with some of the music, and some of the art. I made the end screen. Um, or partially. I helped [name redacted] with the end screen. And, er... Yeah, I made quite a bit of the um, or did little music and art stuff. So, co-development, I guess.
>
> **—Kobi (student co-creator)**

Here, Kobi describes how he was able to engage in the project in many different ways and through different activities, including through contributions to graphics, coding and background music. However, the open and flexible approach to individual activities meant that students often chose different ways to complete the same activity. For example, Figure 9-9 shows some of the different ways that students chose to respond to a prompt to find or create images for a storyboard about the game during an online session. The top left image in Figure 9-9 shows a bird character created in Paint, while the top right shows images which students curated from the internet and added to a shared Google Doc. Both the top images show the style of graphics which students aspired to include in the game. In the bottom two images, students who were in the classroom have chosen to complete the activity on paper, with the bottom left image making use of the worksheet I provided, and text to supplement simple pencil drawings. This shows the different stages of action which the student anticipated the game to include. In the bottom right we see another hand-drawn storyboard which a student has chosen to do using coloured pencils onto a plain piece of paper, featuring a particularly graphic image of a zombie bird being shot by the player's character. Each of these images show how student co-creators

addressed the task in the way that best suited them at the time, whether that be online or in paper-based formats. It is also interesting to note how the ideas from Figure 9-9 were incorporated into the final game. The final game features the gory, graphic violence of the bottom right storyboard, which results from the actions in the bottom left storyboard, using the character drawn in the top left, alongside graphics which mirror the style of images on the top right.

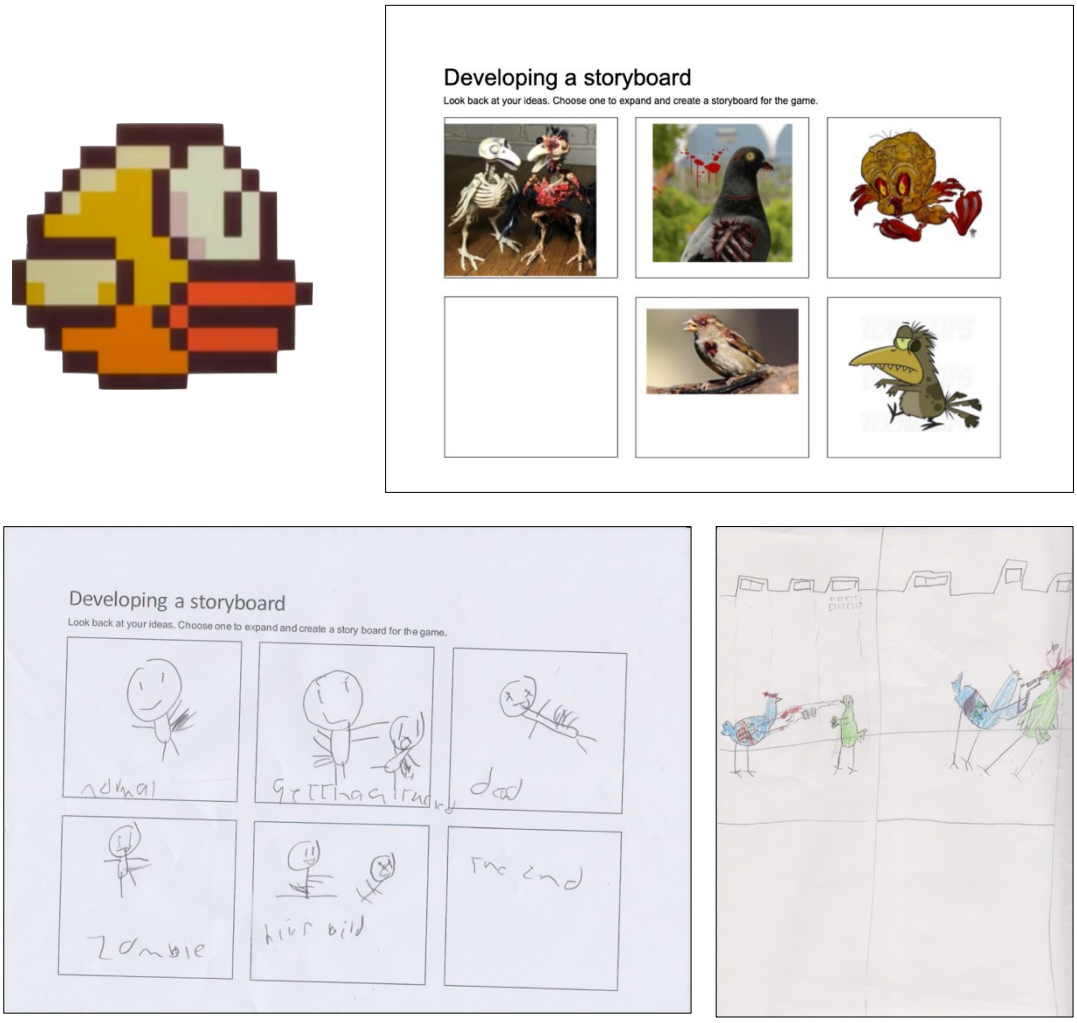


Figure 9-9: Examples of how different students chose to complete a storyboarding task during an online session

Within the flexibility required to enable students to choose how they wish to participate, there is also the option for students to choose not to participate. This was a choice that most student co-creators did not make frequently, though they did often request and have short breaks from individual activities, especially when doing intensive, detail-oriented work such as coding. For Connor, however, the decision not to engage in any of the planned activities was one that he made several times. For example, I wrote the following after a session in which Connor had chosen not to do any of the activities which I had planned:

> Connor said he did not want to do coding, and so I offered him art to do. He didn't want to do that either, and then said he wanted to go on clicker 7. I said this was fine, and explained to [redacted TA name] and [redacted teacher name] that because the activities were for research I never forced the students to do anything, and that it wasn't like other lessons where they had to engage in the work I had planned.
>
> **–Researcher reflection**

Although the decision not to participate as intended was sometimes difficult for me to hear, the nature of activities within a research context meant that his decision was always something that I respected, based on the ethical values of voluntary participation and ongoing consent. The nature of this difference was something which caused a small degree of tension with support staff, who were used to regular classroom contexts where activities are not frequently optional, and productivity is expected:

> All the activities should be voluntary, but allowing students to choose to do nothing is looked down on by school staff who want to see students engaging with the activities offered.
>
> **—Researcher reflection**

However, as the research progressed, I came to understand the flexibility and openness to different means and ways of participating as a fundamental part of student co-creators' experiences, and one which enabled the recognition of students' strengths and the centrality of fun to their experience of researching and designing together.

9.5.2 Recognising their own and other's strengths

Perhaps due to the open and flexible environment which allowed students to participate in ways which best suited them, the project provided important opportunities for students to work to their own strengths. Within the digital stories, we see students assuming the authority which comes with the role of storytellers. We see them making the most of this opportunity to demonstrate their knowledge and talents. Jay and Terry chose to include footage of Jay explaining his game idea, and Andy and Tim included clips relating to their contributions to coding the game. However, Andy and Tim also recognise the strengths of other another student who contributed to voicing the instructions. This strengths-based approach was demonstrated by students through their co-produced interviews, as students recognised the important part which individual students played in contributing to the game:

> My favourite part is about the... when [name redacted] did the voice and it sounded really deep, and really creepily though. I really remember doing that. It was like, it actually sounded real.
>
> **—Andy (student co-creator)**

This acknowledgement of strengths was also relevant to students' understanding of their own learning, where they recognised the important role that other students had played in teaching and supporting them to try new activities:

> I learned a bit of the coding, and some of the mu-, how the music works. Um, how to make the music, um, [name redacted] showed me a very great resource for making music. And there, or, uh, and I also know a very good resource for getting sprites and making sprites are, so, that's very useful.
>
> **– Kobi (student co-creator)**

The recognition of individual strengths and the complementary skillsets which the group possessed contributed to the success of the project and the game as a co-created artefact. The importance of the collaborative nature of the project, and the strengths which each person had contributed was also recognised by some of the students:

> But all of those people that took part, I mean if... if... if that didn't happen then the-, well the game wouldn't work, would it?
>
> **—Levi (student co-creator)**

The importance of collaboration and the strength in working as a team is highlighted in shot 4 of Andy and Tim's digital story, where we see students working together to develop a name for the game. Peer support is provided in moments of frustration, which ultimately made making the game possible.

The individual strengths and contributions of student co-creators was also something remarked upon by one of the industry guests who joined for an evaluation interview. This also gave the student co-creators leading the interview an invaluable opportunity to be recognised for their achievements, and to hear feedback on the game from an adult with relevant industry experience:

> I've looked at all the assets, listened to all the music, uh, and watched the video as well a few times. And I was just completely bowled over, I really was. Um, I just think it's an incredible achievement that you've done, and you all have a part to play in that. The music was exceptionally good, the artwork was brilliant and charming and funny. I thought it was a very, very funny game that gave me a lot of joy, and I thought the title

> was brilliant. And uh, I just, I am amazed actually to be honest, I really am. It made me quite emotional to see it. Even though it's a very silly, and very gory, and there's lots of sort of dark themes in it. But, I like that sort of thing, it made me laugh a lot. Um, but I think that you should all be incredibly proud of the achievement, I really do. I really can't overstate that.
>
> **—Drew (industry guest)**

In addition to the importance of a strengths-based approach for students, the project also provided opportunities for staff to develop and discover some of their own strengths. Several of the staff supporting the project commented on the extent to which they felt they had improved their technical skills, and how their confidence in computer-based work had increased:

> Because now I know, I can work the computer, I can do things on the computer that I didn't know I could do before. Even down just to designing a bird for the game.
>
> **—Joanne (TA)**

9.5.3 Fun at the centre of student co-creators' approaches

As described above and in Ward *et al.* (2022), Jay and Terry's digital story showed a clear mismatch and dissonance between the content of some of the narrative slides and the accompanying footage. For example, without context, the incoherence between the text in the first shot and the footage of the car park in the next may be puzzling. However, knowing them well, I understand that this reflects their sense of humour, and the playful nature with which they approached making their digital story, and the project more widely. Their intention for humour was further indicated by the way they named their initial version of the digital story: "Jay and Terry's funny video" (Ward *et al.*, 2022). The earlier version of that name included the first narrative slide and video clip of the digital story included in this analysis.

The sense of fun seen within the digital stories is not unique to Jay and Terry's. Within Andy and Tim's Story we see bright colours, and dynamic music to convey their excitement and enthusiasm for the project. In Connor's story we see him exploring the freedom of the session to play with the student next to him, and in Sophie's Story we see how she highlights the joviality between herself and another student in her final clip.

The playfulness and enjoyment which students experienced through their participation in the project was also evidenced in their co-produced interviews. Terry spoke about the enjoyment of the more relaxed working environment compared to other lessons, he described coding as a "soothing" activity, and spoke about the opportunity to talk to friends and express critical

opinions about the game “without being told off”. Similarly, another student reported enjoying the more collaborative aspects of the project:

> It [the project] was definitely interesting. Very fun, to see how coding actually is. All the little parts, and it was just very, um, talking to friends about how it all works, and... Like I was talking to [name redacted] about all the music, and where we should put all the music and stuff.
>
> **–Kobi (student co-creator)**

The sense of enjoyment and fun which students felt about the project was further demonstrated by the following quotes, which both came as a response to prompts for final thoughts towards the end of their respective interviews:

> When we were doing that I really, I just couldn't wait for Friday
>
> **—Jay (student co-creator)**

> I think it was the best, the best
>
> **—Andy (student co-creator)**

Importantly, this sense of fun was not a unique experience for student co-creators, and adult members of staff who had contribute to the project also commented on the sense of fun and enjoyment which they had felt:

> It was a really good effort by everybody, and we had a really good laugh and a joke doing it as well. And it was really good working as a team to get it sorted.
>
> **—Joanne (TA)**

> To see our students enjoying coding was very good.
>
> **—Josh (TA)**

This intention for fun and humour can also be seen in the final game itself, through the juxtaposition of cartoon-like graphics, and retro music, with gore and violence. The comedic nature of the game was something that was praised by some of the adult participants in their interviews:

> My favourite thing about the game is it's, I think it's, that it's very funny. It genuinely laugh, and not in a sense of sort of laughing at it, but laughing with the game, it's trying to make you laugh
>
> **—Drew (industry guest)**

In response to questions about the game itself, student co-creators also reported their own enjoyment of the game. Terry and Andy both revelled in playing the game, describing the

enjoyment gained from the effect of holding down the space bar to fire the gun, and the resulting noise and animation of the ammunition being fired.

However, the focus and significance of communicating fun is something which may have been missed if relying on my reflections alone. My notes rarely mention the extent to which individual students enjoyed sessions, instead tending to comment on the activities students chose to do (or not do) and reflections of how I could facilitate their engagement further. In focusing on how students were choosing to contribute and engage with the project, I missed the importance of fun as a means to facilitate engagement and learning. This idea was summarised by one of the guest speakers, after asking students how they had enjoyed the project:

> As long as you guys enjoyed it, I think that's kind of, you know, once you start enjoying it, you know you can keep going with it, and then you might find you enjoy game design so much that you want to keep doing it.
> **—Fred (industry guest)**

9.5.4 Influence and ownership

Students' influence and ownership of the digital stories was clear in their original and creative choices. Despite student co-creators having access to all the footage, student co-creators only chose to use their own footage, or footage which they contributed to producing. Perhaps it is this sense of ownership over the footage they filmed which led Sophie and Connor to developing Stories based around shorter snapshots from their session's filming, rather than making use of what they perceived to be others' footage to tell a wider story about their involvement.

A rare exception to the use of their own footage comes in Jay and Terry's digital story. Shot 10 was not filmed in a session in which either Jay or Terry had control over the camera. Unlike the rest of the shots chosen for the digital story, Jay and Terry filmed shot 10 with a tripod during a session when it was another student, Levi's, turn to use the camera. In the included clip, Levi presents directly to camera, talking about computer programming. Jay joins him on-screen to contribute his own expertise about binary code and the history of computers (Ward *et al.*, 2022). The following quote from my reflections on the session provides some context about the way Levi and Jay collaborated to create this clip (Ward *et al.*, 2022, p. 12):

> Though Jay had chosen to do coding, he was very interested in the video camera which Levi was using. In his normal way, Levi was totally absorbed in the process of filming, and also wanted to create material for the digital stories, not just film what was already going on. He pulled me over a few times to ask me questions about coding, and I could

> hear him narrating other people's work throughout the session. Jay joined him a few times, and I saw him operating the camera while Levi was in front of it, presenting to it.
> **–Researcher reflection**

In contrast to other clips which Jay and Terry included in their digital story, this clip of Levi and Jay neither depicts the students' contribution to creating "Birds with Guns", nor does it particularly help to build the sense of fun which students experienced in doing so. Instead, it appears to highlight and demonstrate the individual expertise and skill of the two students featured. Within this clip, Jay verbalised his knowledge about computing, and Levi exhibited his showmanship and skill at engaging with the imagined audience through the camera. This skill is significant to Levi as he aspired to work as an actor or in film. Consequently, this section of the digital story highlights students' other related knowledge and serves to actively promote Jay to the role of expert knower (Ward *et al.*, 2022).

This adoption of the role of knower, and the authority that comes with it, was key to students' sense of influence and ownership over the game as well. The status of the game as an artefact which mediates this knowledge was recognised by some of the adults who contributed to the project. When interviewing one of the teachers who supported the project, she was asked about her favourite thing about the game. She responded:

> That it's theirs. That it's something that they came together and created, they've designed it, and I think it's a real reflection of, of their kind of personalities, their creativity, but also their humour.
> **—Scarlet (teacher)**

Importantly, this sense of ownership was also something that student co-creators' recognised about their own experiences too:

> My best, the best thing about taking part was, was actually being able to help in creating a game, game
> **—Jay (student co-creator)**

> Um, it was cool to see that we actually used the sprites that we made, so, um, and the music was, was probably my favourite part about it. And, hearing the end, end, end music like being most ramped was cool. It's really cool music.
> **—Kobi (student co-creator)**

These quotes suggest that the act of seeing their work included and implemented in the game was an important factor in building this sense of ownership for students. The digital stories also reveal how moments related to these experiences of influence became particularly significant

for student co-creators. For example, within Jay and Terry's digital story, shots 3 and 4 highlight and depict Jay's role in developing ideas for the game (Ward *et al.*, 2022). The implementation of Jay's idea within the game was a significant moment for him. In an interview he repeatedly related his answers back to this experience, emphasising the value he placed on seeing his idea realised, and the pleasure and esteem he drew from seeing it realised within the game, especially given that there was limited time to develop the game and manifest all his ideas (Ward *et al.*, 2022, p. 12):

> The last level makes, makes the zombies fall from the sky, and I just... like that. E-, and that was one of my ideas.
>
> **—Jay (student co-creator)**

> I just came up with the new ideas which, were very good, but some didn't make it into the game.
>
> **—Jay (student co-creator)**

Time for implementing Jay's ideas was limited because of restrictions on student movement between classes due to the ongoing COVID-19 pandemic. In particular, Jay and Terry missed several weeks during which the other student co-creators combined the initial designs into a single game. However, flexibility in the schedule for the project meant that I was able to incorporate his idea into session planning. This involved creating worksheets to support student co-creators in realising the level design (Ward *et al.*, 2022). I noted Jay's pride at seeing this the week we implemented his idea (Ward *et al.*, 2022, p. 12):

> I explained that the last part of the coding for the day was implementing Jay's idea which he had mentioned the last two sessions. He smiled and seemed enthusiastic to get to that part.
>
> **—Researcher reflection**

The inclusion of the video clip in which Jay explained his idea to me within Jay and Terry's digital story highlights the importance of Jay feeling he had influenced the game design, and emphasised the feeling that Jay felt "Birds with Guns" was, to some extent, his creation (Ward *et al.*, 2022).

9.6 Linking to theory

This final section of my analysis links the previous three with relevant concepts and theories. Specifically, I reflect on how findings from the digital stories relate to theories of learning in

participatory design, notions of agency and participation and the role of voice in multimodal data.

9.6.1 Theories of learning within participatory design

As discussed in 3.4.2 and Ward *et al.* (2022), mutual learning and the process of otherwise marginalised stakeholders assuming the role of expert knowers is central to participatory design. This empowering process of marginalised stakeholders assuming knowledge-based authority is predicated on recognition of "symmetry of knowledge" (Fowles, 2000, p. 63), whereby each person in the group is open to the expertise of others based on awareness of gaps in their own knowledge. This process of establishing a symmetry of knowledge is shown explicitly in Jay and Terry's digital story, where the final clip is contrived for this specific purpose (Ward *et al.*, 2022). In this clip, Jay interrupts Levi's monologue about programming, and consequently Levi recognises his own misunderstanding and accepts Jay's correction (Ward *et al.*, 2022). Nevertheless, the clip simultaneously demonstrates Levi's strengths, namely his skill at presenting directly to camera. In doing so, this clip demonstrates both Jay's propositional knowledge through his explanation of the meaning of 'binary', and Levi's practical knowledge about how to engage an audience through the camera (Ward *et al.*, 2022). Through Jay and Terry's choice to include this clip, Jay actively assumes and promotes himself within the role of expert knower, while recognising Levi as one too, despite differences in the ways that knowledge is manifested (Ward *et al.*, 2022).

The establishing of student co-creators as expert knowers was also evidenced through the interviews, where both members of staff recalled turning to students for advice:

> If we were stuck on something and we were like "oh no, it's not working, we can't run it" we'd ask them [student co-creators] and then they'd look for it and they'd know what they were doing. They'd be able to help us.
>
> **—Samantha (TA)**

This aspect of assuming the authority associated with expertise relates closely with the recognition of student co-creators' strengths. Engaging and participating in the ways students chose to also allowed opportunities for staff to recognise the students' expertise in areas which they had not been able to demonstrate otherwise at school:

> I also learnt a lot about coding which I didn't know about before. [laughs] And then from the students, I think it was kind of learning about talents they had that they weren't necessarily sharing
>
> **—Scarlet (teacher)**

Though each of the digital stories shows different aspects of students' experiences, overall they cover a wide selection of the activities which co-creators engaged in during the process of making the game. This demonstrates an understanding of the range of activities which go towards making even a simple game. Across both their digital story and interviews, student co-creators demonstrated their own learning as theorised within social semiotics (Kress and Bezemer, 2015), through the making and remaking of signs which demonstrated their experiential knowledge of designing and developing "Birds with Guns".

This learning is also evidenced in interview data, in which both students and adults reflected upon the contributions of the whole group to making the game and remarked upon the complexity and difficulty of making the game:

> I think the best thing was learning new skills and learning about new computer programs which I hadn't used before. So I think not only the, obviously the students really enjoyed coding and learnt a lot but I think the adults did as well.
>
> **—Josh (TA)**

> I did remember, when I first, making birds with guns, I was like, it was quite hard.
>
> **—Andy (student co-creator)**

As noted in Ward *et al.* (2022), Terry related these experiences back to his own knowledge of Minecraft, comparing something which is built by a team of professionals, rather than a small group of school students. Through his participation, Terry came to understand better the complexity of work needed to create the types of games he enjoys, despite having missed some of the more direct engagement with technology professionals.

9.6.2 Agency and participation

As in Ward *et al.* (2022), this analysis of the four digital stories suggests that student co-creators found their participation in the project to be both meaningful and enjoyable. This was most evident through the emphasis placed on moments through which students practised agency, and took ownership of specific ideas, such as Jay's development of zombie-birds falling from the sky in the final level (Ward *et al.*, 2022). In contrast, scaffolding was recognised as potentially limiting the student co-creators' agency. Specifically, Jay and Terry describe programming as "copying code" within their digital story, rather than language which might

reflect that they developed content for themselves. This experience of coding as copying rather than writing for themselves was also noted by another student co-creator who chose to respond to the co-produced interview schedule in writing.

> Actually writing something myself, we copied everything off a piece of paper- like sale that was easy but it doesn't let me learn anything
>
> **—Ken (student co-creator)**

This highlights the difficulty in providing structure and support that enables students to fully participate in activities without limiting their contributions. As relatively novice programmers, for whom some of the required programming syntax was new, providing examples and templates was necessary to enable the student co-creators to contribute to building the game. Furthermore, the complexity involved in building even a simple game from scratch is considerable, and so the time limitations placed on the project because of changing timetables between school years meant that ensuring the game was completed by the end of the academic year was a necessity. As in Ward *et al.* (2022), the students' experience was one of "copying code" which I had written, rather than writing their own. Nevertheless, programming the game appears to have been a positive experience, as reflected in both the digital stories and the interview data presented above.

However, adult participants noted the extent to which student co-creators' agency and creativity had been enabled to flourish through engaging in the project. Drew, one of the industry guests, recognised the nature of the game as something which had been produced by and for student co-creators, who linked the increased sense of agency to students' motivation and commitment to the project:

> I think that the school has done very, very well in not limiting that sort of thing, because something that is striking and funny and memorable is always, sort of, more fun to work on, more easy to find motivation for.
>
> **—Drew (industry guest)**

9.6.3 Voice in multimodal data

Overall, the digital stories communicate a sense of the fun which student co-creators took from the project, the activities which they enjoyed, the significance of seeing their ideas realised, and being seen as experts. Additionally, the digital story methodology appears to have provided a way for student co-creators to effectively communicate their understanding and perspectives on designing and building "Birds with Guns", including providing them with ways to demonstrate their different forms of knowledge and ways of knowing.

This is particularly important for students who were unable or chose not to engage with other forms of evaluating the process of designing and developing "Birds with Guns". Specifically, though Connor was offered the option to contribute to co-produced interviews he chose not to, and on the one occasion where he did agree to take part in interviewing one of the TAs in the classroom, he changed his mind about doing so part way through the interview. Similarly, the nature of Sophie's engagement with the project on a short-term basis meant that she was unable to contribute to any of the interviews as she was doing a different extra-curricular activity. Furthermore, her contribution to filming and digital story creation came as a surprise to me and other staff, as noted in the reflection below:

> I said that I should offer it [the opportunity to film] to Sophie as she had not yet had a go. Previously her teacher had said that she didn't expect her to want to, I was surprised that Sophie did want to have a go at filming.
>
> **—Researcher reflection**

This highlights the importance of digital stories as a means of enabling students to co-construct narratives about their educational experiences, especially for those who may face other barriers to being heard. Some of the most meaningful moments for students, including Jay's description of his ideas which was featured in his digital story, relate to moments where students felt listened to, and where I have responded and reacted to their voices so that they felt they had influence over the process. This emphasises the need for researchers and educational professionals to act as active listeners who provide opportunities for students to communicate their stories in their own ways.

9.7 Discussion and conclusions

In this study, I have explored the views and experiences of neurodiverse student co-creators who designed and developed a computer game during a coding club. Specifically, I have focused on the insights gained from a detailed multimodal analysis of the digital stories supporting interpretations with other co-produced data. The analysis suggests that students enjoyed and valued their experiences of creating "Birds with guns", and their sense of fun appeared to be central to their experiences of participatory design. Through the digital stories, interview data, design outputs, and researcher reflections presented in this section of the thesis, I highlight the significance students placed on their enjoyment of the process, which might have otherwise been missed or recognised less fully if solely relying on adult-led or generated data.

The digital stories documented students' involvement in the project and provided an opportunity to capture different forms of knowledge with the student co-creators. Filming allowed individual student co-creators to approximate aspects of their lived experience through the capturing of audio-visual data from their own perspectives as they held the camera. Filming also documented other students' practical knowledge, for example within the clip of Levi showing his presenting skills. Through the process of selecting and editing footage, student co-creators constructed their own multimodal narratives about their experiences, by choosing how to use their footage as well as apply the additional effects available within the editing software, such as music, animations, and sound effects.

The freedom and space which digital story creation allowed seems to have increased the meaningfulness of the project for some students, who created additional opportunities to incorporate playfulness both while filming and within the final videos. As noted in Ward *et al.* (2022), some students made the most of available music and special effects within editing software to set a fun, playful tone. The use of digital stories to capture student experiences can therefore be seen as a successful response to calls from other participatory design researchers such as Spiel *et al.* (2017) for the adoption of more flexible data collection methods. The findings presented here highlight the value of digital stories which allow the flexibility needed to move beyond adults' concerns and priorities to focus much more strongly on children's contributions and perspectives.

The school-based nature of this research, especially within the context of changing COVID-19 restrictions, highlights issues related to research participation. For example, the move to online learning and the subsequent limitation of student movement within school meant that some students were effectively excluded from some sessions. This limited the extent to which students such as Jay and Terry could influence early stages of design. However, later opportunities for them to contribute to the design were seized upon, and Jay drew considerable value from this aspect of his engagement with the project (Ward *et al.*, 2022). Consequently, it appears that Jay felt his contribution was sufficient to have mostly avoided the frustration which has been reported by other participatory design researchers trying to negotiate and facilitate the contributions of different stakeholders over the course of a project (Bossen, Dindler and Iversen, 2012). On the other hand, this move to online learning also allowed students who would not have otherwise participated to contribute, and this gave students like Sophie the opportunity to experience the same sense of collaboration, creativity and fun as evidenced in her digital story.

The perceived need for scaffolding to enable continual progress within the time available for the project resulted in limitations on students' influence over the process of game development,

nevertheless opportunities to integrate their own ideas and decisions were extremely important to students. In particular, the imagination, development, and integration of Jay's idea, which formed the third level of the game, was emphasised across all the data he contributed to, indicating its significance within his experiences of the project (Ward *et al.*, 2022). This underlines the need for enabling students to *have a say* rather than merely *have a voice* (van der Velden and Mörtberg, 2014). Within this context, the role of researchers and designers is to be active listeners who respond to students' voices and recognise this responsibility, which results from their power over the participatory design process. Even when students build the outcomes of designs themselves, they may require scaffolding to do so, and as providers of that scaffolding it is up to us to adapt to students' changing contributions. Project plans therefore need enough flexibility to respond to the students' contributions as they emerge. In this case, a more rigid schedule of work with more clearly defined design and development phases might not have allowed for contributions to graphics, music, voice acting and game play to be implemented, meaning student co-creators might have lost the sense of satisfaction and ownership which came from seeing their ideas integrated into the game.

With respect to learning, student co-creators developed their understanding of game-making through engaging with the project, as depicted by the variety of activities which students engaged with and included in their digital stories. Both students and staff also reflected upon their own learning about game development during the co-produced interviews. Furthermore, through both the digital stories and the interviews, students evidenced and reflected upon their developing collaboration skills, and the process of working together in ways that drew upon people's strengths. For example, the end credits of Jay and Terry's digital story clearly recognised the teamwork which contributed to its creation. This further illustrates the value of flexibility and agency when it is afforded to students so they could choose how they engaged in participatory design. Following Bratteteig and Wagner (2012) and Ward *et al.* (2022), I see this recognition of individual strengths and knowledge as an empowering process for student co-creators which is reinforced by the agency they showed in adopting and adapting the resources available for the creation of the digital stories to their own means.

Building on Ward *et al.* (2022), the findings presented here emphasise the insights which digital stories can provide into the experiences of neurodivergent children and young people within participatory design, and the significance of such experiences. A such, this research provides evidence for some of the potential benefits to neurodivergent children and young people engaging with participatory design processes, where there is scope for them to do so in a meaningful way. This finding supports Benton and Johnson's (2015) suggestion that allowing children and young people to have more opportunity to contribute and influence designs is more likely to bring about benefits to the children and young people involved. However, further

research is needed to understand how meaningful participation might be facilitated in projects with more fixed objectives, where there is increased potential for conflict between neurodivergent children and young people's choices, and what is needed to achieve research or design aims (Parsons and Cobb, 2014). Based on this analysis, digital stories may offer a useful means for accessing the views and experiences of any participants involved in such research. Furthermore, this study demonstrated the extent to which autistic young people can take agency and responsibility over digital story co-production, ensuring that the digital stories are a stronger reflection of students' experiences and priorities than more traditional methods. Consequently, this study has added to evidence for the utility of co-created digital stories as a means for schools to capture students' views on other educational experiences.

In conclusion, the digital story methodology allowed for less constrained description of experiences, enabling expression which was less bounded by my own or support staff's intentions or expectations. As in Ward *et al*. (2022), the nature of digital stories as a multimodal artefact was key to this, where the wider choice of modes allowed for expression of knowledge not easily conveyed through spoken or written language. Additionally, this research has shown that it is possible to facilitate participatory design in a meaningful way that allows students to feel they have influence over outcomes, even within the constraints of school-based research. With the right conditions, this study demonstrates that school-based participatory design can be an empowering process through which students develop symmetry of knowledge which allows recognition of both their own strengths and the strengths of others.

Part Three Extending transition support with digital stories for a new school building

10 Introduction

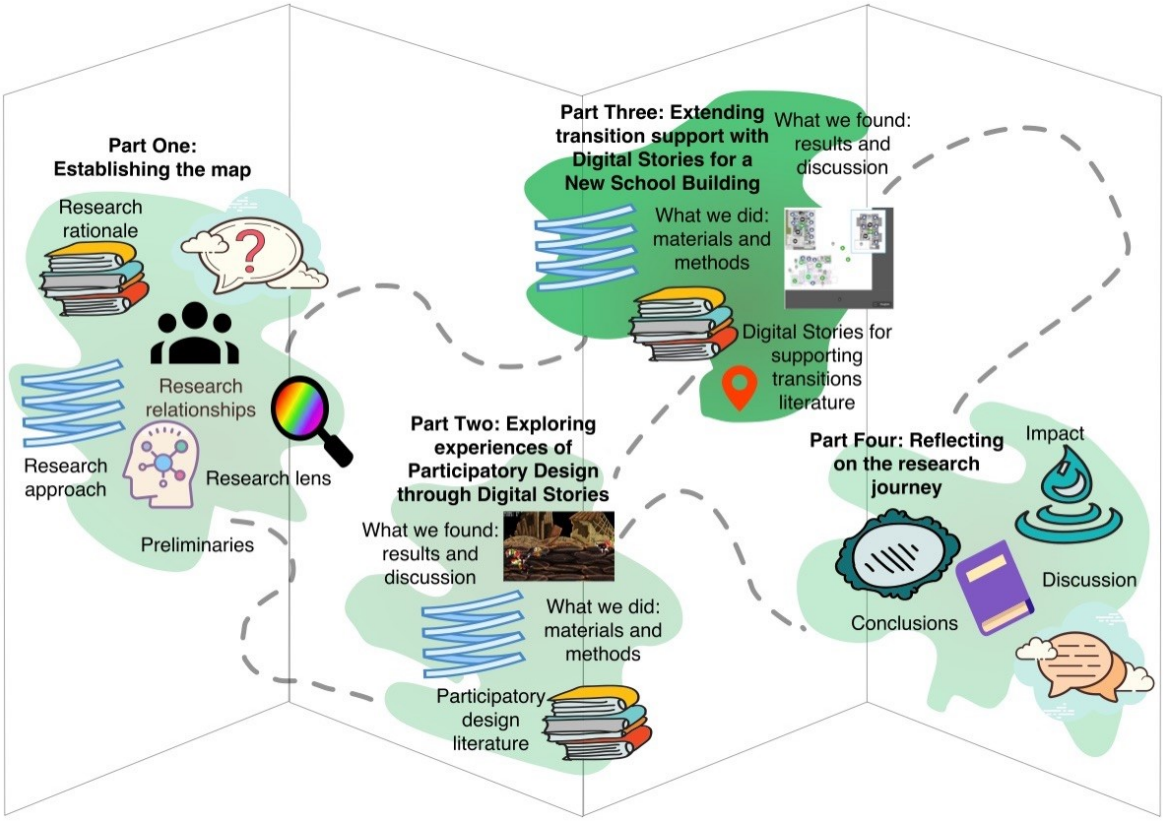


Figure 10-1: Current position and progress through the thesis, according to the thesis map.

Our current location in relation to the rest of the thesis is shown in Figure 10-1. In the first two Parts of this thesis, I set out the theoretical and methodological thinking which underpins my Doctoral research, and explained how this was manifested in the first study. The first study employed the digital story methodology to investigate the experiences of a group of neurodivergent students from Fairmead School in a participatory design project which developed “Birds with Guns”, a retro shooter-style computer game.

In Part Three, I will detail the second study, which builds on evidence created through other research-practice partnerships by extending the use of digital stories as tools to support educational transitions. This Part has three sections: in the ‘Background’, I give discuss the growing body of literature proposing and supporting the use of digital stories as transition tools, and explain the context of the research in terms of my relationship with Fairmead School and their development as a school. In ‘What we did: materials and methods’ I give an overview of the

study, before giving more detail about the participants, methods and analysis. Finally, in 'What we found: results and discussion' I present the findings from the study, drawing on data from four co-created digital stories, five 360° immersive videos, planning activities and evaluation data including scaffolded student reflections and interviews.

11 Background

11.1 Digital stories for and about autistic nursery-aged children

Following research establishing digital stories as a tool for gaining insights into autistic students' educational experiences (Parsons, Guldberg, *et al.*, 2015; Guldberg *et al.*, 2017; Ward *et al.*, 2022), the use of digital stories has been expanded as a tool to support vertical transitions of autistic children into new educational settings (Parsons, Kovshoff and Ivil, 2020). This development of digital stories from a research tool to an educational practice has occurred through the close collaboration between research-practice partnerships (Parsons, Kovshoff and Ivil, 2020). In such partnerships, new knowledge is co-constructed through activities which build upon educational practitioners' professional experiences, the lived experiences of autistic children and young people, and their families, and researchers' academic expertise (Parsons, 2021). In particular, digital story research drew upon educational practitioners' and parents' knowledge of the autistic children involved so that new educational settings could better support their needs through and after their transition (Parsons *et al.*, 2021). Understood through the lens of the double empathy problem (Milton, 2012), digital stories were intended to provide a way to fast forward the development of interactional expertise so that new educational professionals could better understand a child and more quickly identify and provide the support that they needed during the transition to a new educational setting (Parsons, Kovshoff and Ivil, 2020; Wood-Downie *et al.*, 2021).

The research-practice partnership at the heart of these digital stories developments was between researchers at the University of Southampton and Aviary Nursery (Parsons *et al.*, 2021). Researchers worked with parents and nursery staff to create digital stories with and about autistic children (Parsons *et al.*, 2021). "I am" digital stories featured footage from wearable cameras which children had worn during their time at nursery, as well as footage filmed by researchers and nursery staff (Parsons *et al.*, 2021). These short clips were combined with short narrative sentences which provided some context or interpretation of footage, to deepen the

insights for viewers who were otherwise unfamiliar with the child in question (Parsons *et al.*, 2021). The research team also created a series of other digital stories for each child[3]:

- "This is" videos showcased adult perspectives (from nursery staff and parents) about the children involved in research;
- Horizontal transition Stories captured the nursery's individualised practices for facilitating everyday transitions between tasks;
- Vertical transition Stories featured conversations with nursery staff about how adults can support children in their transition from nursery to primary school;

Aviary Nursery have since developed their practice to include the use of "I am" digital stories within their person-centred and transition planning meetings (Ivil, 2018). Across each of these contexts, the intention is that "I am" digital stories serve to represent the "voice" of the child, who is often not able to attend and contribute directly to such multidisciplinary planning meetings, primarily due to their young age (Parsons, Ivil and Kovshoff, 2020; Parsons *et al.*, 2021). The practice of using "I am" digital stories in this way has also , expanded beyond Aviary Nursery to others following collaborative dissemination activities, and the creation of a set of resources to support new settings in developing "I am" digital stories for their own pupils(Parsons, Kovshoff and Ivil, 2019).

Within the context of the COVID-19 pandemic, the limitation of external professionals visiting nursery sites has also meant that "I am" digital stories have been used to support Educational Psychologists and schools prepare transition plans and EHCP reviews (Wood-Downie *et al.*, 2021; Lewis-Dagnell, 2022). Findings from a pilot study reported that Educational Psychologists found the digital stories to be invaluable in their work both during the pandemic and beyond it, where time to observe and build relationships with children is limited (Wood-Downie *et al.*, 2021).

11.2 Extending the knowledge base beyond "I am" digital stories

More recently, the digital stories methodology has been expanded to new contexts and purposes through a series of pilots as part of the wider ESRC-funded "Our Stories" project (Parsons, Kovshoff and Yuill, 2021; Parsons *et al.*, 2023). These pilots have seen older autistic students engage more actively in the construction of their own "I am" digital stories to support them as they transition to new educational settings (Parsons, Kovshoff and Yuill, 2021; Parsons *et al.*, 2023). This represents a move towards neurodivergent children and young people having

[3] To view examples of these from the original project please see the project website here.

more agency in the creation of narratives about themselves, such that they become the authors of their own Stories with a greater say in how they are presented to new settings.

Other pilots have created new types of digital stories, including "We are" stories which focus on educational settings rather than children (Parsons, Kovshoff and Yuill, 2021; Parsons *et al.*, 2023). In contrast to "I am" Stories which, until this point, have been made about children and young people for adults to get to know them, "We are" stories are created by and for educational settings to inform incoming (transitioning) students about the setting (Parsons, Kovshoff and Yuill, 2021; Parsons *et al.*, 2023). Within the pilot projects, the "We are" Stories were made by adults for children and young people, with children and young people involved in shaping and planning content required to support them in transitions to new settings (Parsons, Kovshoff and Yuill, 2021; Parsons *et al.*, 2023). In one pilot, existing students within a Key Stage 2 setting contributed to a voice-over narrative and commentary of an adult-made "We are" tour to support incoming students (Parsons *et al.*, 2023). In another pilot, a "We are" tour was made to support a particular young person in begin work experience, based on her questions and requests (Parsons *et al.*, 2023). I extend the digital story methodology further by inviting students from Fairmead School to contribute every stage of co-creating digital stories about the school, to support other students in their transition to (or back to) Fairmead at the beginning of the 2021-2022 academic year. In this way, neurodivergent students are both the authors and the audience for the digital stories co-created within this study.

11.3 Research aims and context

During the time I was conducting the research detailed in Part Two, Fairmead School was in the process of constructing a new building which was due to be opened in September 2021. Although the building work was on schedule, the timing of this work and ongoing COVID-19 restrictions meant that there was no access to the new building for students in the 2020-2021 Summer Term, and limited access to staff who had to be accompanied by the site manager and wear appropriate safety clothing and equipment. Consequently, Fairmead School were unable to incorporate in-person visits to the new building in their transition planning for current students. Visits to new buildings and settings can be extremely helpful activities to support autistic students with vertical transitions to new settings and environments, and are a common element of transition plans (Cauley and Jovanovich, 2006; Nuske *et al.*, 2019; Richter, Popa-Roch and Clément, 2019). Furthermore, with the opening of the new building in September 2021, Fairmead School expected an increase in student numbers from approximately 110 to 150 students. They therefore needed to provide some additional support for the new students joining the school in September 2021.

Through my ongoing relationship with Fairmead School I suggested the potential usefulness of digital stories, given their initial success in other contexts reported above. Though Fairmead School's Senior Leadership Team were enthusiastic about the idea of creating some digital stories about the school to support the upcoming transition, they saw the need for some support in doing so. Consequently, we decided to collaborate on a second research study to explore the opportunities for students to co-create some digital stories and immersive 360° videos about the school. The aim for this research project was to co-create digital stories and immersive 360° videos about Fairmead School which reflected students' views and experiences. The intention was for the digital stories and immersive 360° videos created as part of this study to sit alongside the other materials that Fairmead staff were creating to support the transition for students into the new school building. Both the co-created digital stories, and the other transition resources were to be hosted within a single virtual tour, which students and their families could access through the school website, as an extension to their existing transition support practices. As such, this study continues the legacy of co-constructing knowledge about digital stories through research-practice partnerships.

As set out in Research rationale, my research question for this study was: How can co-creation of digital stories provide opportunities for agency, collaboration and learning for and with autistic students? Consequently, the following sections concentrate on the aspects of the project which were co-produced with students from Fairmead School, rather than the virtual tour as a whole. 'What we did: materials and methods' gives more detail about how student co-creators, staff and I co-created digital stories and reflected on those experiences. The final section of this Part ('What we found: results and discussion') will present the digital stories we co-created, explore the process of making them and what we can learn from them.

12 What we did: materials and methods

12.1 Overview

The aim of this study was to work with students from Fairmead School to develop a series of transition support resources that reflected both what existing students wanted others to know about Fairmead School, and what they themselves wanted to know about the new school building ahead of the transition to the new building in September 2021. In line with the "Our Stories" pilot projects (Parsons, Kovshoff and Yuill, 2021; Parsons *et al.*, 2023), this study extended the digital story methodology as students from Fairmead School were supported in co-creating digital stories about school life, as well as immersive 360° videos of key places in the existing building. These resources were combined with other adult-created resources within

a virtual tour to support the September 2021 transition, but it was the process of co-creating digital stories and immersive 360° videos with students which formed the focus of this study.

The study proceeded in two phases (shown in the timeline for Figure 12-1): a first co-creation phase in the Summer term of 2021, and an evaluation phase in the Winter of 2021-2022. As justified in 5.3, there were several weeks of relationship building conducted before the initiation of each phase of the project, during which I attended students' lessons and got to know them without conducting any other research-related activities. In the first phase, a group of KS4 students worked with me and supporting members of staff to co-create the digital stories and immersive videos about the school. In the second phase, another group of KS4 students (consisting of some of the original group and some new students) conducted some scaffolded reflection activities and co-produced interviews about the digital stories and the process of making them. These activities were based around the metaphor of *recipes* and *reviews* of the digital stories; a fuller description of these activities is given in section 12.6.

Figure 12-1: Overview of research activities for transition support study

Most of the sessions for both the co-creation and evaluation phases took place during *Accessing the Community* lessons, with a few exceptions for filming sessions which were conducted during other parts of the students' regular timetable (such as during existing PE sessions or at lunchtimes). *Accessing the Community* lessons at Fairmead School form a core part of the curriculum intended to support students in the development of key skills for adulthood (Fairmead School, 2020). *Accessing the Community* lessons provide dedicated time for teachers to support students in strengthening relationships, friendships and community, employability, resilience and communication (Fairmead School, 2020). As such, senior leaders felt the highly collaborative nature of co-creating digital stories would provide learning opportunities in keeping with these goals. Research activities were led by me and the groups' regular class teacher (who contributed throughout both phases of the project).

The first phase of the study was affected by COVID-19 restrictions; the main collaborating teacher was limited in how much time he could spend in the classroom for several weeks, due

to the imposition of “bubble” systems to mitigate the spread of infection from social mixing indoors. During this time another KS4 class teacher stepped in to support the project.

Like the first study, this study adopted a participatory action research methodology, which is primarily characterised by an iterative process of planning, action, and reflection (as in Figure 12-2[4]). The participatory action research methodology was operationalised in a similar way, with each week’s session considered a new iteration of the spiral. However, the approach was developed too as both the planning and reflection phases for each iteration were considerably more collaborative than in study one. The class teacher contributed considerably in terms of shaping activities and facilitating access to resources during planning phases. We also consistently made time for short reflective conversations after sessions which supplemented my own reflective note taking practices. The action within each iteration consisted of activities which contributed to the co-creation and evaluation of digital stories; a full schedule and more details about the activities across each phase of the study is provided in sections 12.4 and 12.6.

[4] Although the participatory action research approach implemented here conceptualises iterations of planning, action, and reflection as a spiral, Figure 12-2 depicts the process as a series of distinct cycles, to support the reader in understanding how it was operationalised within weekly *Accessing the Community* lessons.

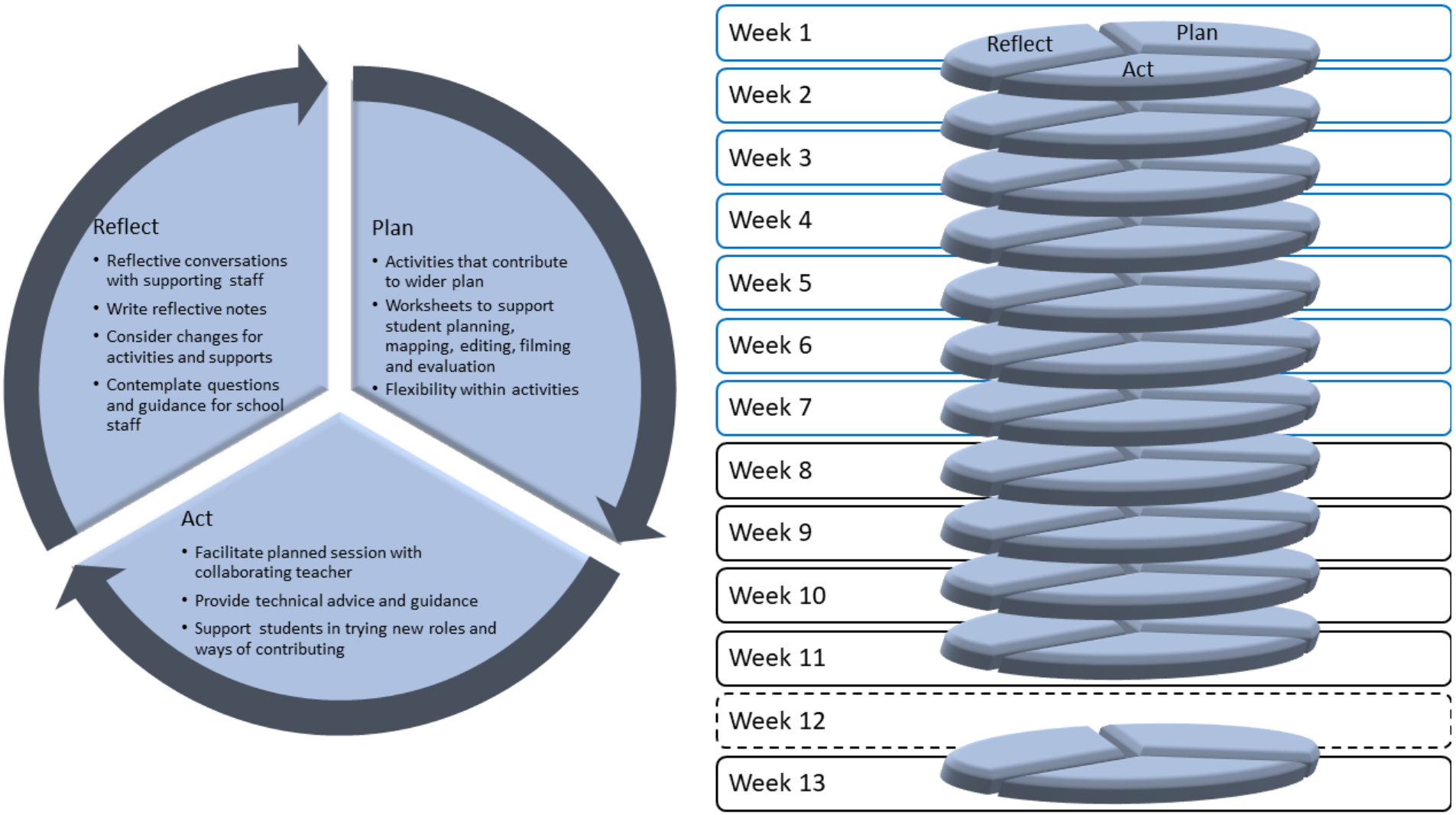


Figure 12-2: Implementation of the participatory action research within the second study

12.2 Research collaborators: student co-creators and support staff

For the first phase of this study, 12 student co-creators were recruited from the collaborating teacher's KS4 *Accessing the Community* class. They were aged 12-16 years old and included seven girls and five boys. Given the opportunistic nature of the project, time was an important factor to consider when making the ethics application, and so no further demographic information is available for the group. Including additional demographic information (such as ethnicity) within the data collection process would have increased time to gain institutional ethics approval by requiring approval from the Research Integrity and Governance Review, as well as the Faculty Ethics Committee. As the first phase of digital story co-creation needed to be completed before the end of the academic year, I decided to forego the collection of this data. A discussion of this, as well as some of the other wider ethical issues which my research raises, can be found in Part Four.

Five of the student co-creators from the first phase also took part in the second evaluation phase of the study (two girls and three boys), and a further four boys joined the group to help evaluate the digital stories. Changing student involvement between phases of the research group depended on their membership of the collaborating teacher's *Accessing the Community* group. Although two student co-creators from the first phase moved out of Fairmead School to other Further Education settings between phases, all other students moved internally from or to different teaching groups.

During the first phase, we were supported by five members of school staff, including three TAs who supported students to co-create their digital stories, the collaborating teacher, and another KS4 teacher who supported while "bubble" based COVID-19 restrictions were in place. A further six members of school staff were recruited based on who the students wished to include in their digital stories. As the evaluation phase of the project worked with a slightly smaller group, it was supported by the collaborating teacher and a TA.

12.3 Procedural Ethics

12.3.1 Phase One

Ethical approval for phase one was sought from University of Southampton (ERGO number: 64893). In phase one, written informed consent was sought from parents and guardians for their children to participate. Information sheets and a link to a supplementary information video were circulated to parents and guardians by Fairmead School, who then returned signed consent forms to indicate that they were happy for their children to participate (all links and ethics forms

for this phase of the study can be found in Appendix E.1). Some parents and guardians were concerned by the filming aspect of the project, and so several families agreed for their children to participate on the basis that they would not be featured in any footage included in the digital stories. This slightly restricted engagement was negotiated on a case-by-case basis between parents and the collaborating teacher, to allow students to participate in the project while respecting the safeguarding concerns of their parents and guardians. Given that the filming was only a small element of the project, the collaborating teacher and I felt that restricting students from roles in front of the cameras would not impede their experience of involvement too greatly.

Written consent was also sought from students, to formally confirm that they were happy to participate. Students were provided with a video and information sheet (in either a language-based or Widgit symbol-supported version) and given the opportunity to ask questions before being asked to sign a consent form (again in a language-based or symbol-supported version). Given the ongoing, dynamic, and collaborative approach within this project, these formal documents for students were supplemented with a conceptualisation of consent as an ongoing process of negotiating roles and responsibilities (Frauenberger, Rauhala and Fitzpatrick, 2017). Staff involved in the project also gave written informed consent to participate in the project, through the reading and signing of information sheets and consent forms.

Across all the information given for the first phase, it was made clear that participants were consenting only to contributing to the research project. Though the intention to share the digital stories on the school website was included in this information, it was made clear that the school would contact relevant people separately to confirm they were happy for footage of them (or their children) to be shared on the school website before it was put online. As a consequence of this, data contained within this thesis is shared according to the original stipulations of the procedural ethics documents (with faces visible but using pseudonyms rather than real names).

12.3.2 Phase Two

Once plans for the evaluation phase of the study had been established with the collaborating teacher, an amendment was added to the initial ethics application to seek approval for the second phase (ERGO number: 64893.A1). Parents of students who had already participated in phase one were sent additional information about the evaluation phase to ensure they had an opportunity to ask further questions or withdraw their child from the study if they had any concerns.

For students who were new to the project in phase two, we sought written informed consent through the distribution and collection of information sheets and consent forms. New students were also provided with simple information sheets, and consent forms to complete to indicate

they were happy to participate. Support was provided with reading these documents for those who required it, and students were given the opportunity to ask any questions before they were asked to sign the consent forms. Links and ethics forms for this phase of the study can be found in Appendix E.2. No additional staff were recruited to support with the second phase of the study.

12.4 Co-creating digital stories about Fairmead School

The digital stories created for this study are best described as “We are” stories, which represent Fairmead School as a place and a community. There has been much less work done on formalising the methodology for developing these types of digital stories compared to the “I am” Stories, which are usually created to rapidly build more holistic knowledge about a child or young person. There is an established framework for co-creating “I am” Stories based on four stages of digital story development: mapping, filming, describing and editing (Parsons, Kovshoff and Ivil, 2019). Consequently, the approach for the co-creation of digital stories about Fairmead School drew upon and adapted the established framework for creating “I am” digital stories. Each of the activities which student co-creators contributed to can be linked back to one of the four stages set out in the original framework for creating the “I am” digital stories, or an additional *planning* stage which was required to decide the themes for mapping ideas for content. A schedule of activities along with how they mapped to this original framework can be seen in Table 12-1. Further details about the activities involved in each stage can be found in sections 12.4.1, 12.4.2, 12.4.3 and 12.4.4.

Most activities were primarily planned for completion using Google Classroom through the Jamboard functionality, which allows multiple users to contribute to shared slides using post-it notes, text and images. This choice reflected the potential need to move to online participation, as well as the flexibility this afforded in terms of participating individually, in small groups or as a whole group. Jamboards were a tool which the collaborating teacher used regularly within his own lessons, and allowed the option for students to work with printed, physical copies which they could draw or write on directly, if they wished. Data collected from activities consisted of the final Jamboards and worksheets containing records of student ideas and decisions, recorded reflections with the staff supporting the project, and my own reflexive notes from each session.

Table 12-1: Schedule of activities for Phase One of the transition support study

Week Number	**Stage(s) of digital story creation**	**Activities**
1	Planning	Generating questions about Fairmead School and the new school building
2	Planning Mapping	Sorting questions into themes Diamond nine activity to prioritise themes Embodied school navigation Generating ideas for each themes
3	Mapping Filming	Assigning topics to groups Reviewing and adding to ideas for each theme Filming round school for DS Filming staff interviews
4	Filming	Filming immersive videos Filming staff interviews Filming PE lesson
5	Describing Editing Filming	Reviewing student footage Writing descriptive phrases/sentences Combining phrases and footage Adding special effects and music Filming lunch in the hall
6	Editing	Combining phrases and footage Adding special effects and music
7	Sharing	Watching the finished stories together

12.4.1 Planning

The first stage of creating "I am" stories usually involves mapping ideas according to the key areas and questions found in Table 12-2. In this study, there were no existing "We are" Stories to work from, meaning students needed to generate and prioritise the themes they wanted to address within their digital stories from scratch. As there was no established set of topics for the initial mapping of ideas in "We are" Stories, an additional *planning* stage was needed to

generate the themes for mapping. In early “I am” story research, Stories were first created then thematically analysed to generate the themes for mapping (Parsons, Ivil and Kovshoff, 2020).

Table 12-2: Key themes and questions for initial mapping of "I am" digital stories (Parsons, Kovshoff and Ivil, 2019; Parsons, Ivil and Kovshoff, 2020)

Theme	**Questions**
Spaces	Where does the young person like to be or explore?
People and interactions	How does the young person like to spend their time and who do they interact with?
Independence and agency	What does the young person choose to do for themselves?
Objects and interests	What is the young person really interested in and like doing?
Communication and expression	In what ways does the young person express themselves?
Support	What support is helpful to the young person?
Skills and capabilities	What is the young person good at?

Planning activities were primarily conducted through the use of a Google Jamboard, which allowed students to anonymously add their own questions and ideas to a set of shared slides. Initial questions were generated from the following prompts: “What are our key questions for September?” and “What questions will new students want answers to?”. Students worked individually or in small groups (as they preferred) to add questions to the shared Jamboard, using digital sticky notes in a choice of colours and sizes. Figure 12-3 shows some of the questions which students generated based on the question prompts, relating to a range of concerns about the upcoming transition into the new school building.

To refine these questions into a set of themes which could be used to map ideas for digital story content, the planning stage involved two further activities. Firstly, the students worked together to group similar questions, by moving questions around the Jamboard and changing their colour. Figure 12-4 shows the results of this reorganisation such that similar questions were near or next to each other, and adjacent groups were different colours. For example, the upper left corner has three clusters of questions which relate to toilets (in green), lunchtimes (in yellow) and timing of horizontal transitions (in orange). Though there are other thematically distinct clusters in green, yellow and orange, these are visually distinct based on their situation on the Jamboard.

Figure 12-3: Questions which students anticipated for themselves and new students regarding the transition to the new school building in September 2021

Figure 12-4: Students' grouping and organising of questions to generate themes for mapping

Having clustered similar questions together, the students worked as a single group to name (or summarise) each themed cluster. Some clusters were summarised with a single word or phrase, and some were left in question form, echoing the multi-faceted nature of the question clusters/themes and the flexibility with which themes should be named (Braun and Clarke, 2006, 2021). The themes were then prioritised, using a diamond-nine activity (McCabe and Horsley, 2008), in which students ranked the themes from most to least important through a

series of collective discussions and votes. The results from naming an prioritising themes for mapping are shown in Figure 12-5.

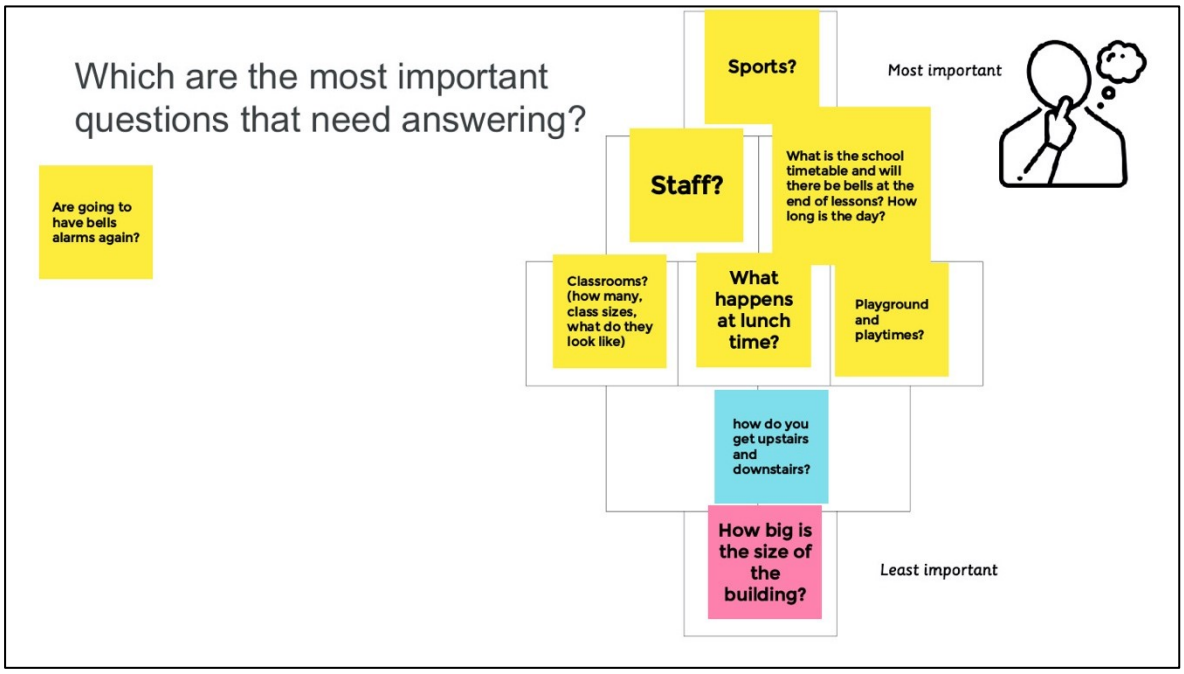


Figure 12-5: Students' priorities for the themes within the digital stories

12.4.2 Mapping

When creating "I am" stories, the themes and questions for mapping support the recording of ideas which are ultimately combined into a single digital story (Parsons, Kovshoff and Ivil, 2019; Parsons *et al.*, 2023) In this study, the number of student co-creators meant that separate Stories could focus on each theme to more fully address students' concerns and priorities relating to the transition into the new school building. Once students had planned the themes they wished to concentrate on for their digital stories, students engaged in an embodied navigation activity to help think about what information would be particularly important for new and transitioning students. This activity consisted of two parts, firstly, students were given a numbered map of the existing school building and asked to walk round the school and label the rooms and places depicted on the map. Then, when they had successfully done this, I presented them with another map of the new building (which they could see from the courtyard outside their classroom), and I asked them to work out which way round the building was. By doing this, I intended to highlight the difference in their knowledge about the current and new buildings, to support students in thinking about both what information they want about the new building, and what new students might want to know about the school more generally.

Having finished the embodied navigation activity, students worked in small groups to map the content of each needed for each thematic Story. The generation of ideas for each theme was supported by a Jamboard slide, which provided separate space for students to capture both the answers to the question, if the theme was a question, and what they might want to film to show their knowledge. An example of the mapping for the theme related to lunchtimes is shown in Figure 12-6. Each group spent a short time thinking about and adding ideas to each of the themes, before themes were assigned to specific groups in preparation for filming. These small groups were named after colours which the group members chose for themselves (purple, blue, red and black).

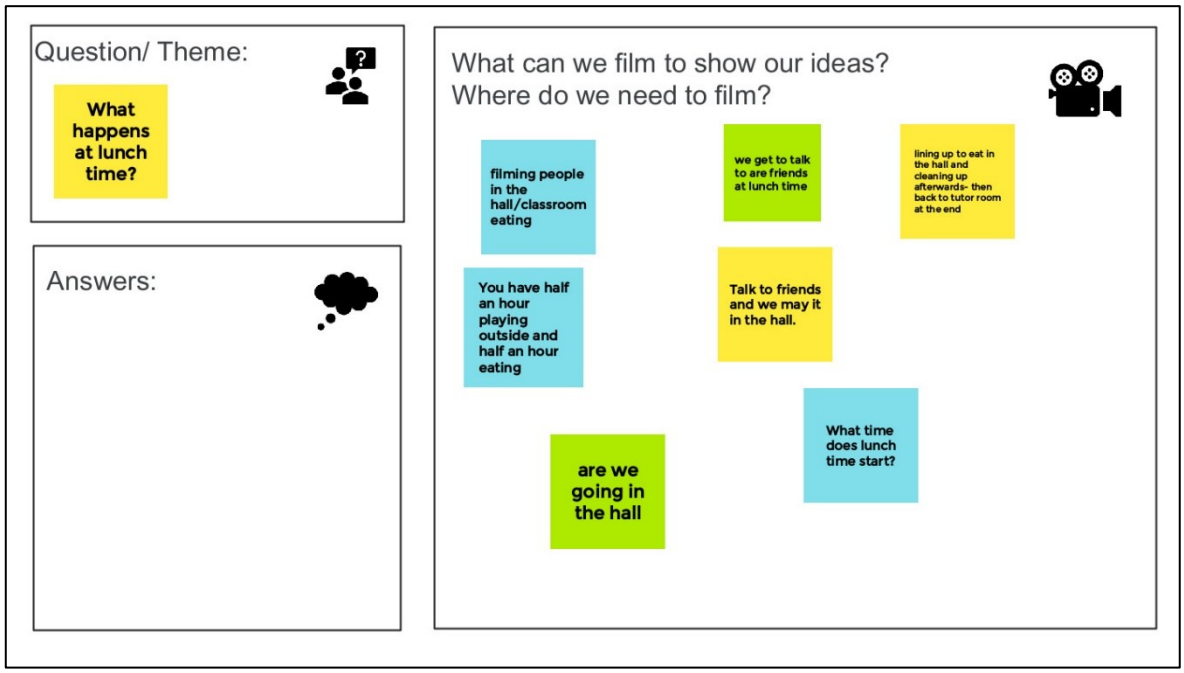


Figure 12-6: Example of student mapping based on theme related to lunchtimes

12.4.3 Filming

The filming and editing for each topic was mostly completed by the group allocated to that topic, though inconsistency in attendance due to illness, transition support and regular therapy sessions meant some of these activities were shared with students from different groups. Roles within filming, including for the 360° immersive videos (see below for more details) were negotiated based on students' preferences, strengths and participation restrictions; as mentioned previously several students' parents and carers indicated that they were happy for them to take part on the basis that they were not featured in any footage included in the digital stories. As shown in the schedule (Table 12-1), filming was mostly conducted during *Accessing the Community* sessions, though additional filming took place during lunchtimes and PE lessons, to capture authentic insights into school life for students.

Before students had the opportunity to access and use footage, there was an intermediary step when I reviewed and organised what the students had filmed. As the process of filming had been much more targeted at capturing specific footage than the first study, this was a comparatively smaller task. Nevertheless, it was an important step as it meant I could remove any footage of students whose parents or guardians had consented for them to appear on film. Data collected from the filming and editing stages are the final digital stories, recorded reflective conversations with the staff supporting the project, and my own reflexive notes from each session.

12.4.4 Describing and editing

Given the technical complexity of editing immersive video, students were not involved in editing the 360° immersive videos. However, the existing groups worked largely without adult intervention to describe and edit the digital stories based on the themes they had generated themselves. The process of describing footage and editing together the digital stories started with students reviewing the footage I had organised for them. They watched through the clips they had filmed, and used another Jamboard to support them in describing key things they wished to include in their Stories, and to identify any additional footage which was missing to complete their Stories. An example of one groups' review and description of footage can be found in Figure 12-7. Finally, students used Windows video editor to combine their footage with narrative slides, filters, animations and background music to complete their digital stories.

In the last week of the 2021 summer term, at the end of this co-creation phase of the study, the only activity was to watch through all the digital stories that the students co-created and explain where they could find them to view during the school holidays. This final stage of sharing the co-created digital stories and 360° immersive videos was extremely important in terms of their use as a transition tool, as without this stage the co-created resources would only be accessible to those within the study team. I spent the first part of the lesson exploring the virtual tour which had been created using the students' digital stories and 360° immersive videos. Students watched back each of the Stories they co-created, and viewed the supplementary 360° immersive videos which I had created with staff in the new school building. Student responses to this were mostly recorded in my own reflexive observations written shortly after the session.

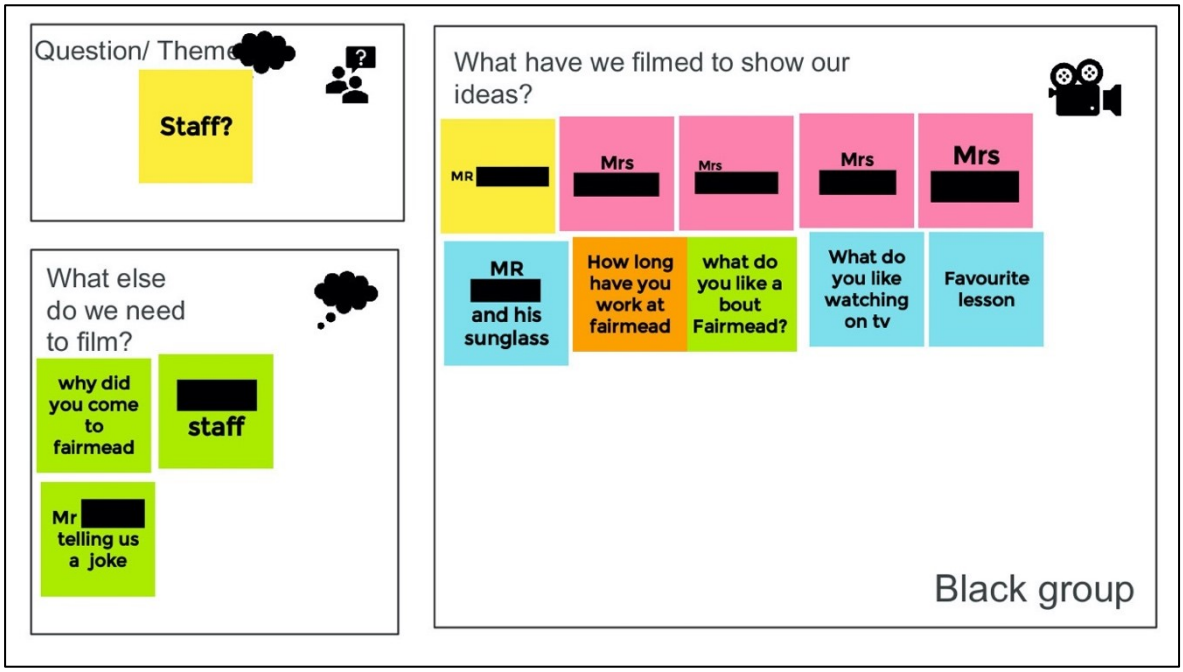


Figure 12-7: Student's review and description of footage

12.5 The virtual tour

Figure 12-8 shows the virtual tour created using the digital stories co-created by students from Fairmead School. For the tour, the digital stories and 360° immersive videos are overlaid on a map of the school featuring a floorplan of the old building, and both floors of the new building. The floor plans were based on simplified versions of the building plans, as these were readily available to me and the staff preparing transition support materials during this study. Different types of transition support content are accessible through the different icons shown in key (Figure 12-9). Green symbols indicate content co-created by students. The “play” symbols show “We are” digital stories, and the video camera symbols show the 360° immersive videos. Map pins indicate labels for locations, and the person symbols represent transition videos made about the staff who will be working in each classroom. In total, the virtual tour features four “We are” Stories and five immersive 360° immersive videos co-created by students, and three 360° immersive videos created by staff in the new school building. Some of these Stories are repeated and appear in multiple locations on the virtual tour.

As mentioned in the previous section, the tour was made available to students through the school website before the end of the summer term 2021, and all students were shown how to access it in the last week of term. Students had access to it over the summer holidays before their transition back to school and into the new building in September 2021.

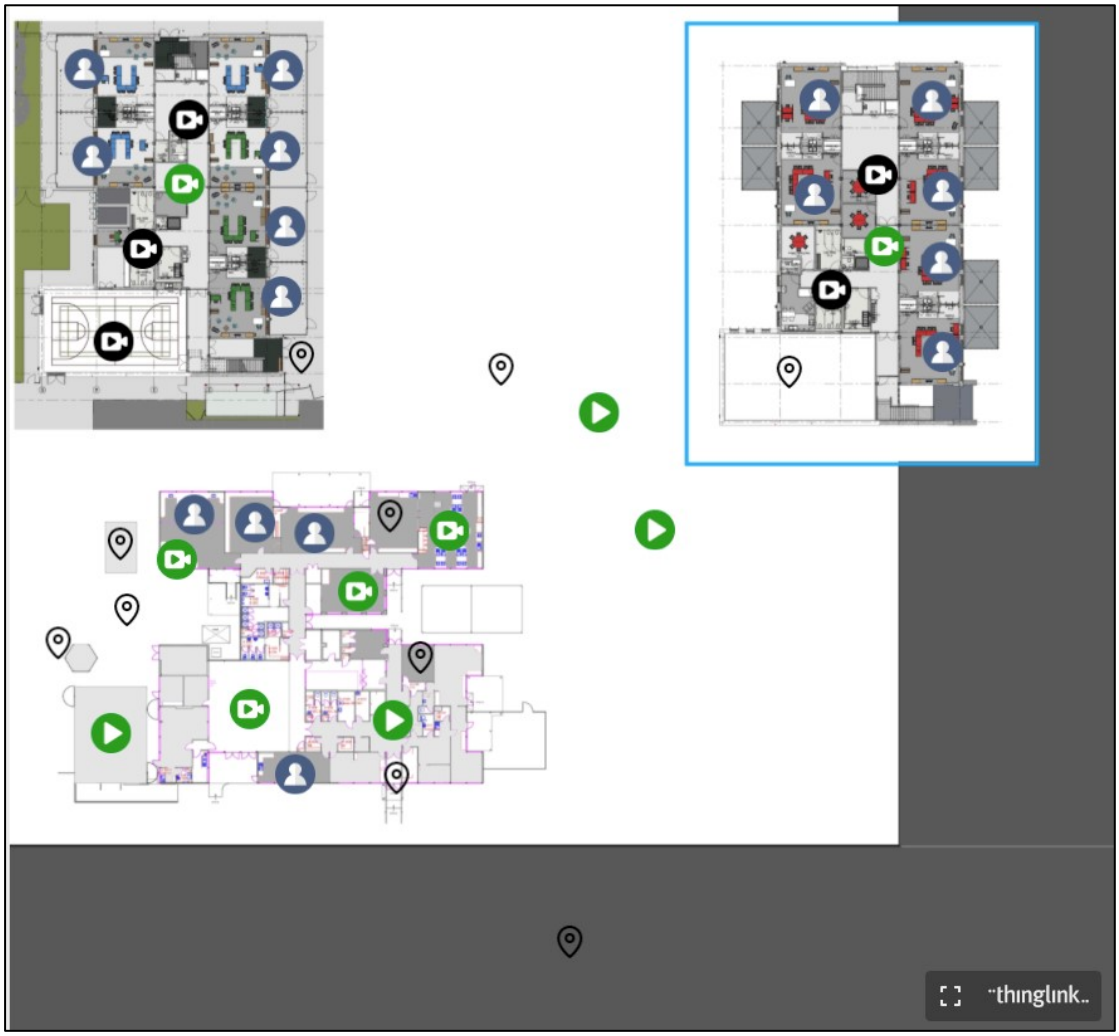


Figure 12-8: Screenshot of virtual tour of Fairmead School

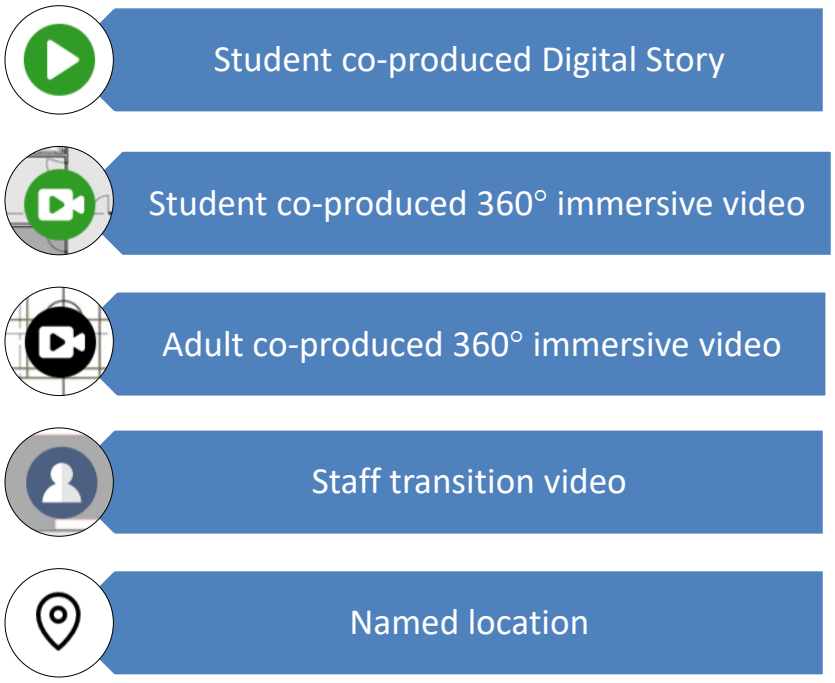


Figure 12-9: Key to interactive symbols on the virtual tour

12.6 Evaluating the project using recipes for and reviews of the digital stories

The schedule for the second phase of the project is shown in Table 12-3. Following the co-creation of the digital stories in Summer 2021, it was important to reflect with the students about the digital stories, and the students' experiences of developing them. Heron and Steckley (2020) recognised the opportunities for evaluating digital story creation using co-produced methods. However, given the difficulty of critical reflection for some novice researchers (Welikala and Atkin, 2014), it was necessary to provide some scaffolding to support students in exploring their thoughts and experiences of the project. Therefore, I created two activities to encourage students to critically reflect on both the outcomes (the digital stories) and the process of their involvement in the first phase, which helped students reflect before contributing to co-produced interviews. The two reflective exercises were structured around the metaphors of recipes and reviews.

As some students joined this phase without having participated in the first phase of the study, both these activities were conducted in self-selected small groups (with a maximum of four students) with mixed expertise of those who had and had not engaged in the first phase of the study. A couple of students chose to complete these activities independently, or with the support of the adults present. Completion of these activities was also supported by whole-group review to encourage students to reflect more deeply on their views and experiences. Both activities were made available to students via the Jamboard functionality on Google Classroom. Paper copies were also available; however all the students chose to engage in the digital versions of these activities.

Table 12-3: Schedule of activities for phase two of the transition support study

Week Number	**Research Activities**
8	Refamiliarisation with the virtual tour and digital stories Introducing the recipe activity Thinking of the ingredients of a digital story for their recipe Developing the recipe method
9	Reviewing and adding to their digital story recipes Introducing the review activity Writing critical digital story reviews Discussing changes to the digital stories

Week Number	Research Activities
10	Co-producing the interview schedule Student interviews
11	Updating digital story: adding animation effect to Teachers Story
12	None
13	Student interviews

The first recipe-based activity encouraged students to reflect upon the process of co-creating the digital stories and 360° immersive videos, echoing the presentation of evaluation activities within McCabe and Horsley (2008). Students worked to document the process of co-producing the transition resources by thinking firstly about the key "ingredients" (i.e., the technology and equipment) and then the "method" (activities and procedures) which they had used to create the digital stories. An example recipe that was produced from this activity is shown in Figure 12-10. For each stage of this activity, students were introduced to the task before being given time to do it for themselves. After a while, the class reconvened to discuss the activity as a single group before returning to the activity to update and add detail to their initial efforts, echoing the collective reflection which I had come to see was a common feature of the collaborating teacher's lessons.

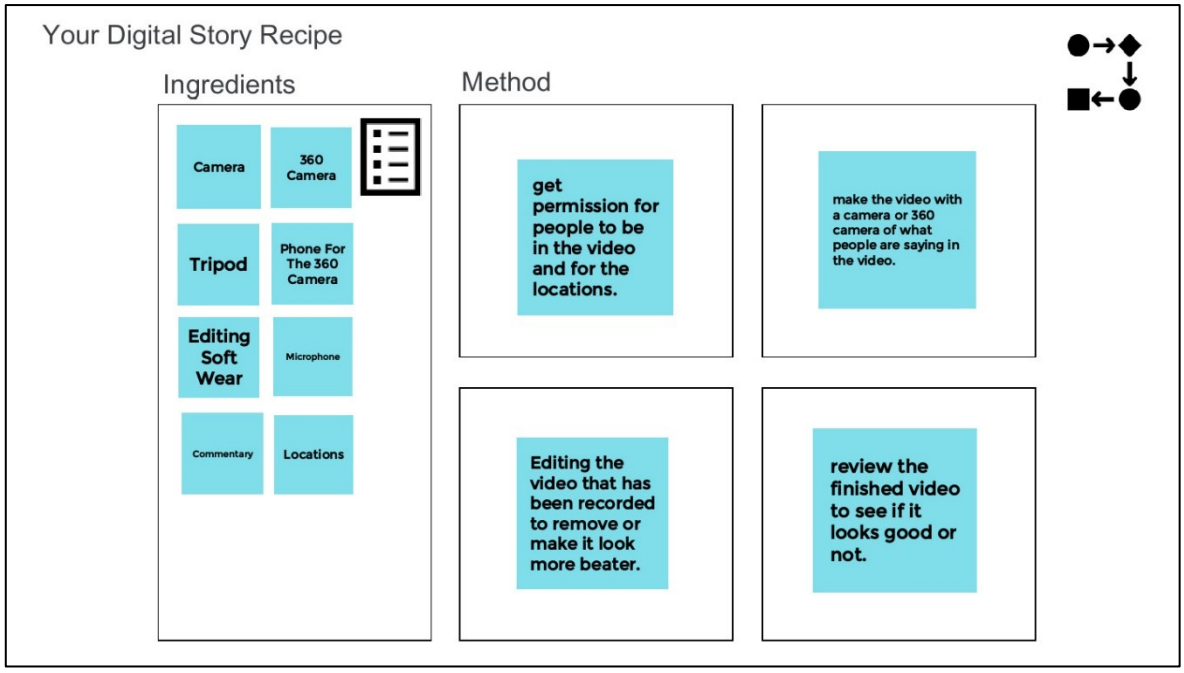


Figure 12-10: Example digital story recipe

The second review-based activity encouraged students to express their opinions about the digital stories, and make explicit what they liked, disliked and what could be improved. Once

again, students were given a Jamboard or printout to which they could add their ideas. Students were given a free choice of how they completed this task, and so students chose to indicate their views within the star-rating in different ways. An example of one group's review can be seen in Figure 12-11, which shows the stars digitally coloured-in, in addition to both free text and sticky notes in the box below. Initially students worked on this task individually or in small groups, before a second iteration of updating their reviews based on collective discussion and reflection.

Completing the recipe and review activities took two 90-minute sessions, after which we worked as a group to co-produce some interview questions about their recipes and reviews. Students were then given the opportunity to take part in an interview, either alone or in small groups. Most students chose to do this in small groups, though one student chose to do this alone. In total nine students contributed to the evaluation phase, with eight choosing to take part in interviews. During each of the four interviews, students took turns to ask and answer questions from the co-produced interview schedule (shown in Figure 12-12). This approach, which allowed flexibility and choice over how the interviews were conducted, follows work by Silver and Parsons (2022) which suggested knowledge and control over conversations lead to autistic people feeling more comfortable and able to contribute.

Figure 12-11: Example digital story review

Figure 12-12: Co-produced interview schedule

In addition to the evaluation-related activities, during the second phase, I also worked with one student (Tilly[5]) to update a digital story she was featured in. While refamiliarising the group with the digital stories, it became apparent that Tilly was uncomfortable with some of the footage she featured in. Her initial request came from a place of discomfort with watching the footage of herself stimming by rubbing and waving her hands. These movements can be recognised as self-stimulatory behaviour (stims) which autistic people often perform to self-regulate or express their emotions (National Autistic Society, 2022). Consequently, we discussed the options to remove, edit or embellish the footage such that she was happy with it. We worked together to explore these options, and she decided that she would like to add an animation to the section she was concerned with, and in one of the sessions we worked together to choose and apply an animation to the relevant sections of the digital story. Once we had finished applying these changes, she reviewed it again and I updated the digital story on the virtual tour. This experience is discussed in more detail later in 13.6.1.

Unlike the first phase, some of the activities for the second phase were interwoven with other activities which formed part of the students regular “Accessing the Community” lessons. Consequently, although the second phase lasted almost as long as the first, the sessions were not solely dedicated to research activities, and students also engaged in unrelated activities which contributed to their ongoing learning about travelling and planning a trip. During the first few lessons of this phase, we only completed research activities, and during later ones we

[5] All of the names reported here are pseudonyms. Where people have contributed to both studies, their pseudonym has been kept consistent across the two studies.

completed more of their other work. Notably, in week 12 we did not manage to complete any research activities as they did not have time between the other work and activities the collaborating teacher set for the lesson.

12.7 Analysis

Consistent with the first study, I adopted a social semiotic multimodal approach to analysis, underpinned by the conceptual and theoretical ideas set out in Key concepts and theories. The data used for the analysis included the co-created digital stories, researcher reflections, planning and evaluation activity outputs, and interviews from the second phase. As described in Multimodal analysis, the analysis proceeded in four stages, starting with an exploration of the modes and composition of each of the four digital stories, and the immersive 360° digital stories. From there, I moved on to explore the role of individual sign-makers and the context in which meaning is constructed, again drawing upon wider evidence from the other sources. The final stage of analysis draws links between the earlier stages and the core concepts of multimodal learning, agency and collaboration.

Following the same approach as for the first study (described in 8.8), digital stories formed the starting point of my analysis, however their status within the analysis is somewhat different. Previously, the digital stories formed a record of the student co-creators' *experiences* of participatory design, whereas here, the digital stories were a tangible *outcome* of their participation. Rather than the digital stories serving as a window into the process of co-production, they are instead primarily the output of co-creation, giving insight into students' views and concerns about school more generally and their upcoming transition to the new school building. Consequently, in this study digital stories are conceptualised as co-constructed presentational knowledge, echoing the way the output of design activities are typically regarded within participatory design (Béguin, 2003). While the content of the digital stories can provide insights into students' educational experiences, I here rely more heavily on additional sources of data, such as intermediary planning documents, researcher reflections, evaluation activities and interviews to give greater insights into the *process* of co-creating the digital stories.

13 What we found: results and discussion

As described in section 12.4, the co-creation of digital stories resulted from the topics which students decided were priorities, and which were then used as the basis for the mapping activities. Figure 12-5 shows the resulting Jamboard from the diamond nine activity used to prioritise topics for students' digital stories. Based on this prioritisation, students mapped out

ideas for what they wished to include in digital stories about each topic. Based on this mapping, and the footage students filmed, student co-creators developed four digital stories about Fairmead School. These stories covered: (1) teachers; (2) classrooms; (3) playgrounds and lunchtimes; and (4) sports. The following sections considers each of these Stories in turn, as well as the five immersive 360 ° videos in terms of how modes are used to represent meaning, and their multimodal composition. Then I discuss how the meaning-making practices were affected by the students as sign-makers and the context of co-creation. Finally, I link the analysis to wider social theory, in terms of theories of learning in multimodality, agency, and collaboration.

13.1 Digital story about teachers

The first digital story was made by “black” group: Tilly, Terry and Jason. They were supported by me, and the collaborating teacher (who you can hear talking to the students out of shot). The topic for this video is ’Teachers’, and it aimed to address questions and concerns raised during the mapping process about what teachers at Fairmead were like and whether they were nice. The digital story is constructed around a series of interviews with teachers, interspersed with narrative slides introducing each teacher. The student co-creators also chose to include introductory and concluding narrative slides to give the Story structure and explain what the video is about. A summary description of the digital story is shown below in Table 13-1.

Some of the teachers in the digital story were purposefully selected by students to be interviewed (and their collaboration had to be arranged in advance), however some of the teachers included represent a convenience sample of those who were available during filming sessions. Consequently, the digital story includes a fairly wide selection of school staff ranging from teaching assistants to senior school leaders.

Table 13-1: Summary of digital story about teachers

Shot number	**Start time**	**Shot type**	**Description**
1	00:00	Narrative slide	Text reads: “Welcome to this video about the teachers. We hope you enjoy it :)” in curly white writing on the right of a plain black background. Energetic game-show style music plays in the background and continues throughout.
2	00:03	Narrative slide	Text reads: “Mr [name redacted]”, in simple white writing in the centre of a bright blue background.

Shot number	Start time	Shot type	Description
3	00:06	Student footage	The TA stands outside, in a red football shirt, answering the questions which come from a voice behind the camera. At the beginning of the clip, a confetti animation appears with an accompanying sound effect, like a rain-maker.
4	00:39	Narrative slide	Text reads: “Mr [name redacted]” in uneven black writing, over a bright blue background and bright colourful rectangles which move and change colour.
5	00:41	Student footage	The teacher stands outside in the playground in front of a picket fence. He wears a grey sports jumper and sunglasses. A sparkler animation makes atom-shapes by one of his shoulders and then he answers questions from behind the camera. The camera wobbles, unsteadily.
6	01:47	Narrative slide	Text reads: “Miss [name redacted]” in curly elegant white writing, on a bright orange background.
7	01:50	Student footage	The TA stands outside the main building, in a black t-shirt, smiling at the students filming. An animation of a flock of orange and black butterflies float over the frame, as she starts answering the questions from the students behind the camera.
8	02:24	Narrative slide	Text reads: “Miss [name redacted]” in simple black writing on a plain white background.
9	02:28	Student footage	The TA is standing outside in front of a blue wall. She is wearing a grey sports t-shirt and sunglasses on top of her head. A red “LIVE” sign is animated in the top right corner of the frame, it flashes then flies out of shot. She answers questions from the students behind the camera.
10	02:57	Narrative slide	Text reads: “Mrs [name redacted]” in white flecked writing, on orange stripes and a coral background.

Shot number	Start time	Shot type	Description
11	03:00	Student footage	Two students and a teacher are sat on wooden benches under a wooden pergola. They are all smiling. Behind them, we see a grey building with a floor height window. An animation of bubbles covers the outer edges of the frame and then they float off. The girl interviews the teacher, and an animation appears as the girl stims with her hands- magical purple and orange sparks and flames. The boy sits next to her and fiddles with his shoe and sock.
12	03:59	Student footage	The interview continues, with a new clip. The animation accompanies the girl's stim and disappears as her hands become still.
13	04:05	Student footage	The interview continues, with a new clip. Towards the end the boy asks a question, celebrating sharing a favourite TV show.
14	04:41	Narrative slide	Text reads: "Mrs [name redacted]" in white flecked writing on orange stripes and a purple background.
15	04:44	Student footage	The two students sit under the pergola with a different teacher. An animation of "24" with a blue and red circular pattern and two stripes that spin then expand out is in the upper middle of the frame. They both interview her, the same purple and orange magical energy animation appears as the girl stims with her hands.
16	07:12	Narrative slide	Text reads: "Thanks for watching!" in white pixelated writing, on a purple background in a white textbox. The music fades as the video ends.

13.1.1 Modes

The modes used in the video and the distribution of meanings across modes are shown in Figure 13-1. Where the focus of this digital story is on people, we see much more meaning being embedded in speech compared with digital stories about other themes. Speech is the primary mode that teachers use to give information about themselves, echoing practices within Fairmead School more widely, but these speech-based interactions also give some insight into the relationships between adults and students in school. The presence of other students (out of

the shot but in the vicinity of filming), for example in shot seven, show how staff relate to not only the student co-creators (who here hold a position of responsibility and power over the camera), but also to other students outside of that role. Gesture is used to reinforce these strong positive relationships between staff and the student co-creators interviewing them, and to acknowledge the presence of other students through smiling and gaze direction. Staff encourage student co-creators through friendly behaviours indicating that staff are active listening while student co-creators are asking questions. However, gesture also reveals relative levels of comfort (and discomfort) of those being filmed; with both staff and students using movement to express a degree of nervousness about being filmed. For example, staff regularly glance from the interviewer towards the camera, whereas students actively avoid looking towards it.

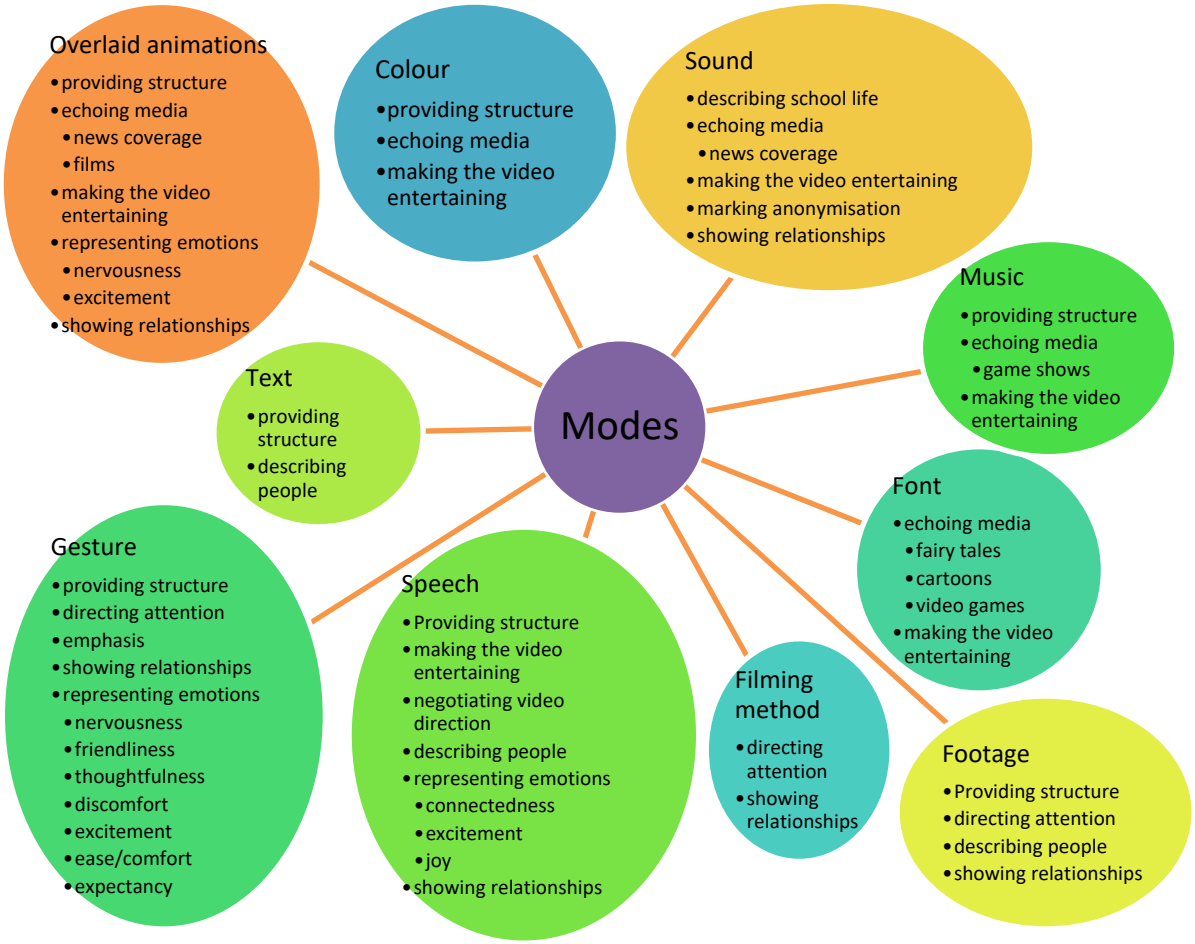


Figure 13-1: Mapping between modes and meanings in the Teachers digital story

However, gesture is not the only mode used to communicate the emotions of those in front of the camera. This digital story also uses a series of overlaid animations to express Tilly's feelings in the role of interviewer. In the process of co-producing this use of the animations, Tilly said she was both nervous and excited when doing the interviews, and she therefore chose an animation that featured colour flames and sparks of light to represent the juxtaposition of nervous energy and power she felt as an on-screen interviewer. This excitement was also reflected in the choice

of music, which is an energetic, saxophone and brass-heavy show-tune, reminiscent of a game show or talk show theme tune.

13.1.2 Composition

The students were fairly formulaic in their structure and the use of modes in this digital story about Teachers. This is demonstrated by their methodical use of narrative slides interspersed with student footage of interviews with teachers, which are bookended either side with additional narrative slides which greet and thank the audience, providing structure and addressing them more directly. Screenshots from the digital story showing the introductory and ending narrative slides can be seen in Figure 13-2.

Figure 13-2: First and last narrative slide from the digital story about teachers

The distribution of modes across the different types of shot are shown below in Table 13-2. In the case of the narrative slides, text is the primary mode which communicates the purpose of the narrative slide, addressing the audience with either a greeting, or providing the name of the member of staff being interviewed in the footage which follows. Despite this formulaic structure, the choice of fonts, transition animations and colour are different across each of the narrative slides introducing the teachers, showing student co-creators' desire to differentiate between each member of staff rather than simply present them as a homogenous group.

Table 13-2: Distribution of modes across shot types in the digital story about Teachers

Shot type	**Shot numbers**	**Modes employed**
Narrative slide	1, 2, 4, 6, 8, 10, 14, 16	Text, font, colour, music, animation
Student footage	3, 5, 7, 9, 11, 12, 13, 15	Footage, filming method, speech, sound, gesture, music, animation

The use of animation across the video clips of interviews with teachers is similarly formulaic in structure. Student co-creators chose different animations for each of the staff members included. This differentiation reflects the way student co-creators valued variety within their

digital story, and the importance of balancing structure and variation to ensure their digital story was simultaneously coherent, informative, and entertaining. However, the choice of animation for each staff member may also reflect their personal qualities and relationship to the students; two members of staff are depicted with butterflies and bubbles, respectively, whereas a more senior member of staff is depicted with a 24-hour news coverage animation. Screenshots showing how each member of staff is introduced and paired with an animation is shown in Figure 13-3 and Figure 13-4.

Figure 13-3: Screenshots from Teachers digital stories, showing introductory narrative slides and footage with overlaid animations for each member of staff

Figure 13-4: Screenshots from Teachers digital stories, showing introductory narrative slides and footage with overlaid animations for each member of staff

However, while the use of animation largely followed this formula of being applied soon after the beginning of the interview clip, with a different one for each member of staff, the use of animation co-produced with Tilly during phase two was different. The animation reoccurred throughout the interview footage in which Tilly featured, based on Tilly's requests that the placement and timing be coordinated with the more energetic movements she performed with her hands. My aim in supporting her to co-produce changes to the digital story was not to cover or cut the behaviour entirely, as I felt this might reinforce whatever negative feelings she was experiencing about watching herself stim. Through trying multiple animations, and with careful choice about the timing and placement, we managed to coordinate the animation and gestures in hand movement stims to give more insight into her emotions at the time. In doing so, together we transformed her feelings around the footage so that she could it accept it as affirming behaviours relating to her neurodivergence, rather than hiding or covering them. A screenshot showing an example of the placement and timing of this animation can be seen in Figure 13-5.

Figure 13-5: Still from digital story about Teachers showing Tilly's animation around her stimming behaviours

13.2 Digital story about classrooms

This digital story is about classrooms, a summary of which is provided in Table 13-3 below. It was co-created by Safiya and Ted who were allocated to the "blue" group. Two other students were also assigned to this group by the collaborating teacher, but their contributions were restricted due to other activities during lesson time, or by simply not wishing to work in their assigned group. Safiya and Ted were supported in making the digital story by Josh, who is the TA that appears in most of the footage. This digital story supplements the immersive 360° videos which were created by the wider class and includes some locations which we did not manage to cover in those videos, such as the soft play area.

Table 13-3: Summary of the digital story about classrooms

Shot number	**Start time**	**Shot type**	**Description**
1	00:00	Student footage	A TA stands at the front of the classroom, and introduces himself and the space. His name is obscured with a low honk. He walks around the space talking about how it is used. Two students sit at a desk in front of him. An animation of an orb of energy is overlaid, and driving energetic rock plays in the background and continues throughout the video.

Shot number	Start time	Shot type	Description
2	00:17	Narrative slide	Text reads: “this is Darwin class” in thick white writing over orange speckled paint-like stripes and a pink background.
3	00:20	Student footage	The TA stands in the school kitchen, and introduces himself and the space. The same low honk covers his name. The picture is in greyscale and uses pixelated mosaic filter.
4	00:33	Student footage	The TA stands outside a playground, with a student. He is leaning against a wooden fence. He introduces them, with names obscured by a low and high honk respectively. He asks the student where they are, and she explains, the TA then gives a little more detail. The picture is in greyscale again, but the picture is clear and in-focus.
5	00:54	Student footage	The student and the TA stand in the soft-play room, next to the string mesh on the edge of the play space. He introduces them, and then asks the student to say where they are again. He responds, saying which students like to use it. The student confirms what he is saying. A low and high honk replace their names. The picture is dark, but in colour and without a filter. The camera wobbles and drifts between the student, the TA and the play equipment next to them.
6	01:09	Student footage	The TA stands in the school library and introduces himself and the space. A low honk replaces his name. The picture is colourful, with a pixelated mosaic filter that dances as he moves. The camera wobbles, unsteadily.
7	01:22	Student footage	The TA stands outside the door to the Design and Technology (DT) room, and introduces himself and the space, gesturing to the door as he talks. A honk replaces his name. The picture is without a filter.
8	01:32	Student footage	The student and the TA stand in the middle of the hall. The TA introduces them, and encourages the student to say where they are. A honk replaces each of their names. The student says where they are, walking forward and swinging her arms

Shot number	Start time	Shot type	Description
			slightly as she does so, as if dancing. The TA adds some further information about what they use the hall for and the camera drifts away from them to show more of the hall. The picture is greyscale with a greenish tint, and has another pixelated mosaic filter applied.

13.2.1 Modes

The mappings between meanings and modes in this digital story are shown in Figure 13-6. Unlike some of the other digital stories, Safiya and Ted applied very few animations on top of student video clips. Instead, they chose to apply video filters which changed the colour, hue and quality to many of their selected clips. Despite the difference in mode, the meaning and purpose behind the application appears to be the same: to add interest and make the digital story more entertaining. However, it is notable that the filters applied in this digital story impede the audience from seeing some of the spaces clearly, and so the extent to which the video effectively shows and explores the classrooms is more limited. Specifically, the mosaic effect of filters applied to shots 3, 7 and 8, in the kitchen library and hall respectively, significantly affect the clarity of the footage. Stills from these shots can be seen below in Figure 13-7.

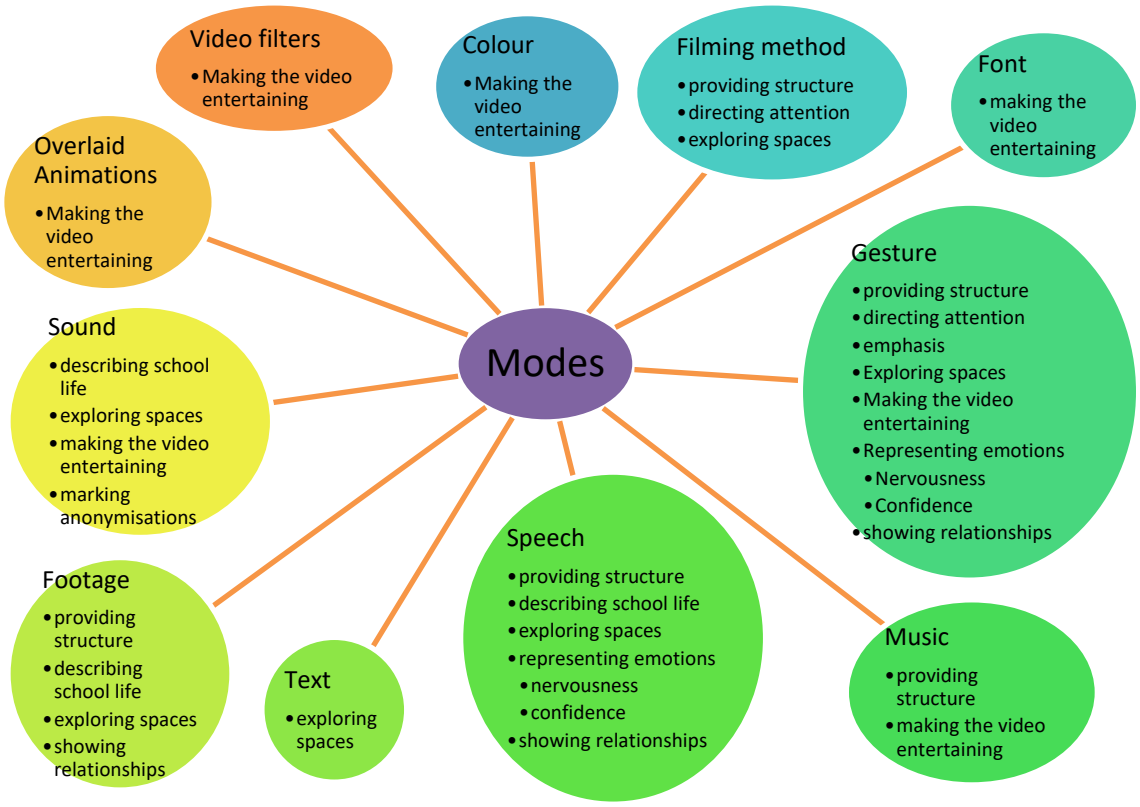


Figure 13-6: Mapping between modes and meanings in the Classrooms digital story

Figure 13-7: Screenshots from digital story about Classrooms

In terms of filming methods, Safiya and Ted chose not to use a tripod, and instead to operate the camera manually, using some of the freedom which this gave to explore the spaces. This exploration is extended with the zoom functionality, which is used to direct attention around the spaces and towards the people presenting at relevant moments. The behaviour and gestures of the people presenting each room shows the progression of their feelings towards this role. In earlier shots, such as 2, 4, and 5, we see Safiya drawing herself inward, looking down and making herself smaller by tucking her hands into her jumper. In contrast, shot 8 shows her looking out towards the camera, gesturing to the room and almost dancing as she explains where she is. This suggests an increase in confidence with practice in the role of presenting.

As the presenters, Safiya and Josh refer to each other multiple times throughout the digital story. To ensure their names were not revealed, it was necessary to obscure their speech. Consequently, this digital story is unique in that it implements sound to mark places where their names were said but have now been obscured. In choosing sound, I picked a "honk" noise with a higher and lower option for each of their names. Though the purpose of this noise was to redact their speech, the choice of noise reflected the role of fun and entertainment which was important to the student co-creators. Indeed, when reviewing the digital story, students found the noise to be incredibly funny, and requested to view it repeatedly.

13.2.2 Composition

The distribution of modes across different shot types is shown in Table 13-4. Like the digital story about teachers, this digital story follows a fairly formulaic structure. However, where the teachers digital story relies heavily on narrative slides to provide context and structure for what follows, this classroom digital story uses text and narrative slides sparingly. Only one shot is a narrative slide, and it appears after the video clip to which it relates, suggesting its purpose is more for emphasis than to provide structure or context for what is to follow. Instead of the reliance on narrative slides, the classrooms digital story relies on a formulaic approach to the video clip itself, and the presenters' interaction with the audience. In each clip, the presenter or presenters address the audience, introduce themselves, say where they are, and then give a little additional information about the place relating to when or how it is used. Thus, although the presence of a formulaic structure is common across the teacher and classroom digital stories, the nature of this structure is different.

Table 13-4: Distribution of modes across shot types in digital story about Classrooms

Shot type	**Shot numbers**	**Modes employed**
Narrative slide	2	Text, font, colour, music, animation
Student footage	1, 3, 4, 5 6, 7, 8	Footage, filming method, speech, sound, gesture, music, animation, video filters

This story also employed the used of supplementary modes to add elements of entertainment. However, the composition of modes is also incredibly important for the construction of a sense of comedy and entertainment. Although the "honk" sound alone was perceived to be funny, the comedy grows when combined with the anticipation that comes with the formulaic nature of the

presenters' actions and speech. The small variations which adjust the rigid formula also added to students' humorous responses, as the unanticipated "honks" also elicited considerable laughter. Consequently, across both the teachers and the classrooms digital story, we see that the repeated formula with elements of variety is a common approach and one which, I suggest, is key to the audiences understanding and engagement with the digital stories.

13.3 Digital story about playgrounds and lunchtimes

The third digital story covers elements from the mapping of what was initially imagined as two separate topics, as shown in Figure 12-5. A summary of the playgrounds and lunchtimes digital story is shown in Table 13-5.

Table 13-5: Summary of digital story about Playgrounds and Lunchtime

Shot number	**Start time**	**Shot type**	**Description**
1	00:00	Narrative slide	Text reads: "we are getting our field back in 2022" in swirly white writing, on a bright pink background. The music begins with a percussive rattle and then continues with an energetic guitar track.
2	00:03	Narrative slide	Text reads: "playground and lunchtime" in a white pixelated font on a purple textbox with a similar white pixelated border.
3	00:04	Text over footage	Text reads: "this is the playground" in white swirly writing. The background is blurred, and then fades to become in-focus. It shows the playground and slowly pans all the way round. Three "LIVE" animations are shown across the top of the frame.
4	00:31	Text over footage	Text reads: "this is the friendship hut". Three orange and yellow stripes with clear flecks appear at the centre of the screen, and writing covers it. A 3D "breaking news" animation appears in the top right hand corner. An animation of some balloons float up from the bottom left of the background splodges. The camera pans left slightly, to show the edge of the hut, and the building behind it, then changes direction to show the space on the other side.

Shot number	Start time	Shot type	Description
5	00:56	Text over footage	Text reads: “this is the scenery garden” in white swirly writing on a blurred background. The blur clears, showing footage on the sensory garden with two “LIVE” animations in the top corners. The camera pans around the whole garden, showing the flower beds and the friendship hut.
6	01:35	Narrative slide	Text reads: “having lunch in hall” in black uneven all-caps writing, on a pale blue background with colourful rectangles which move about.
7	01:38	Student footage	Three students sit to a rectangular table in the hall, eating their lunch They chat amongst themselves and with the researcher who is out of shot. The video ends abruptly, without an outward transition.

This digital story was made by two students who formed the “purple” group (Stacey and Brogan) and Archie, another student who joined them while students from his group attended other activities. Stacey, Brogan and Archie were helped by a member of staff during the filming weeks. They also had help from other student co-creators who agreed to take part in filming the “lunchtime” section, which was staged due to restrictions on student mixing and movement which were otherwise in place at the time. Notably, apart from this clip of lunchtime in the dining hall, there are few clips of students presenting directly or even featuring in the video; this might reflect that this was the first digital story which the students made, and so they were yet to develop their confidence in front of the camera (Brogan is featured in student footage from another digital story). In addition to help from those who agreed to being filmed, Stacey was also supported by another student (Sammy) during the describing and editing stages. Together Stacey and Sammy decided how to bring together the footage which Stacey and Brogan had filmed, and when and how to incorporate narrative text, music and animations.

13.3.1 Modes

The distribution of meanings across modes is shown below in Figure 13-8. Noticeably, this cross-referencing of meanings and modes reveals the relatively restricted use of speech to address the audience. Instead the few instances of speech captured within the digital story demonstrated the relationships between the students on screen and the researcher who is out of shot. Rather than relying on speech, other modes communicate a more varied and complex

selection of meanings than is shown in the other digital stories. For example, the first instance of text highlights the priorities of the students. This sentence described the lack of playing field, indicating the return of the playing field as a priority for the student co-creators, and something which they missed while the building work was being completed. This sentence appeared even before the title or topic of the video, which only appears in the second shot. After that, each of the phrases that followed serve to inform the audience about the accompanying video, by naming and introducing the spaces and routines captured within the digital story. In this way, the text does more than simply naming and describing, as it is used in some of the other digital stories.

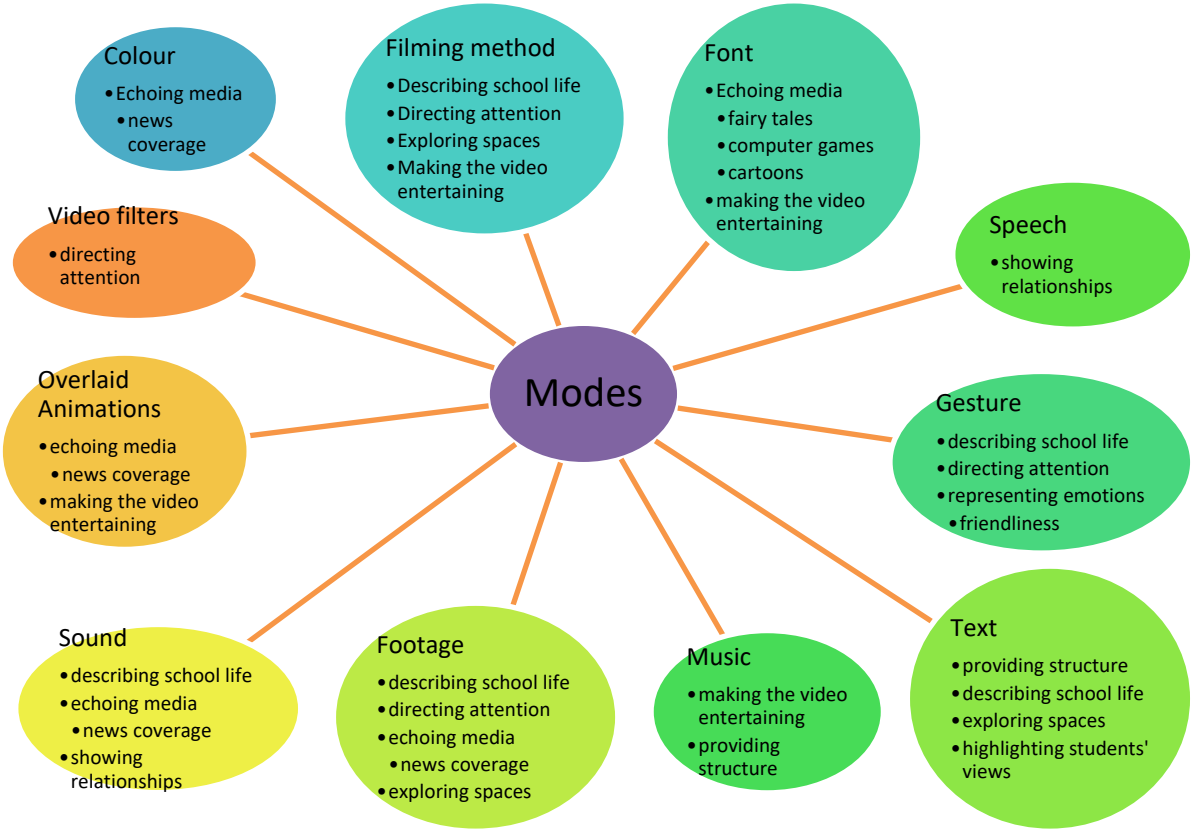


Figure 13-8: Mapping between modes and meanings in the Playground and Lunchtime digital story

With respect to the filming method, the student chose to use a tripod consistently throughout, meaning the footage is stable. Where students used panning, it is slow, showing an awareness for the audience who will watch the footage back. This panning is used to effectively explore the spaces being depicted, and to move and direct the audiences' attention as they are shown the school surroundings.

13.3.2 Composition

Student co-creators chose to use a combination of shot types in this digital story about playgrounds and lunchtimes (the distribution of modes across shot types is shown below in Table 13-6). Figure 13-9 shows how the visual modes are composed throughout the digital story through a series of screenshots. As mentioned above, students used little footage or speech which addressed the audience directly, instead they chose to intersperse text in narrative slides or overlaid on footage to give structure and provide context to the video clips. Consequently, the content of the video which related to objective knowledge about the school, and the spaces and routines which related to playgrounds and lunchtimes, was mostly communicated through modes which could capture them observationally, such as through footage and sound. Modes which do not capture this information so readily, such as music, colour and animation were employed to create the mood and tone for the video which students wished to convey. In this way the digital story manages to convey the objective information which students communicated while also capturing the fun, energetic and playful approach which the students took to co-constructing and communicating this information.

Table 13-6: Distribution of modes across shot types

Shot type	**Shot numbers**	**Modes employed**
Narrative slide	1, 2, 6	Text, font, colour, music, animation
Student footage	7	Footage, filming method, speech, sound, gesture, music
Text over footage	3, 4, 5	Text, font, colour, music, animation, video filters, footage, filming method, sound

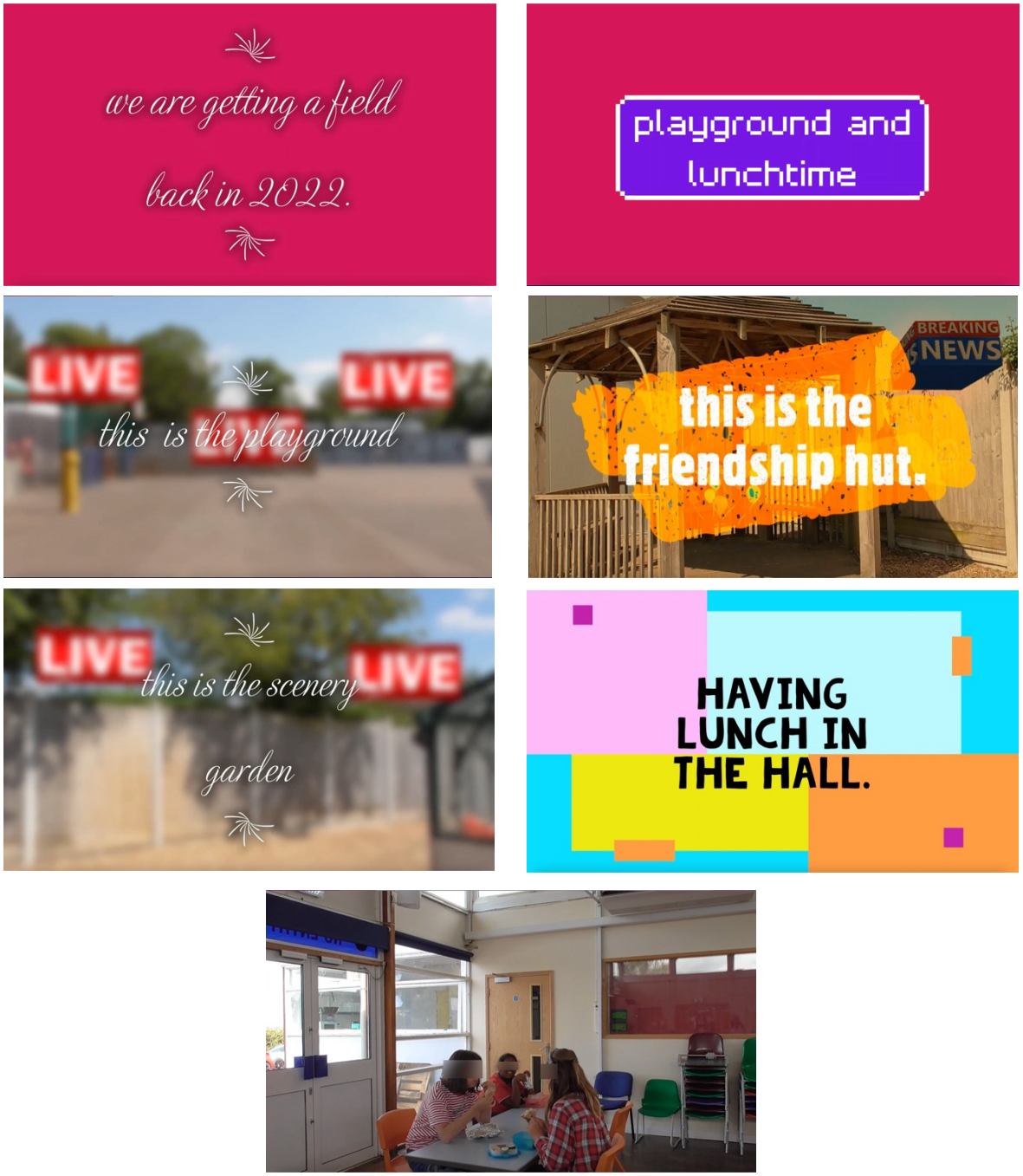


Figure 13-9: Screenshots from digital story about Playgrounds and Lunchtimes

This video provides a juxtaposition between the context and environment at the time of creating the digital story, and what was to be expected for new students arriving in September 2021. In particular, student co-creators wrote about “getting a field back” and contrasted it with the footage of the playground as it was at the time, mostly taken up with temporary classrooms. The difference between the school as it was and as it would be was further emphasised using “LIVE” animations alongside the images of the school playground. In contrast, the footage of lunches in the school hall depicts lunches as they would be in September 2021, rather than as they were at the time, when students ate lunch in their classrooms to prevent social mixing with other classes and year groups. This footage which was contrived for the digital story is not accompanied by any clarifying message. In this way, the student co-creators show a clear

awareness of the differences between their current and future routines and environment and support the audience in understanding what to expect in the new academic year.

13.4 Digital story about sports

A summary of the Sports digital story is shown below in Table 13-7. This digital story was made by the "red" group: Sammy, Archie and Poppy. The prioritisation of "sports" as a topic was driven by Poppy, who although generally quiet, made it clear that the enjoyment she felt from engaging in PE and sports at Fairmead was an important thing to communicate to new students. Although there were louder requests from other groups to make the digital story for this topic, I intervened to allow Poppy to take more ownership over the digital story that spawned from her idea. Following this intervention, Poppy gained in confidence regarding giving directions for the digital story, and so the Story features some of the sports which she enjoyed the most.

As the topic of sports was difficult to film during the "Accessing the Community" sessions, I attended one of the groups' regular PE sessions to capture the footage for this digital story. Given that this filming was done outside the regular session, more care needed to be taken to ensure that all students filmed had the relevant permissions, and so I supported students as they were filming. Jason and Ted contributed to filming, as they did not want to engage in the sports chosen by the "red" group to be filmed. Consequently, the activity of filming during the PE lesson allowed Jason and Ted to engage in the activities of the PE lesson when they had otherwise chosen not to.

Table 13-7: Summary of digital story about Sports

Shot number	**Start time**	**Shot type**	**Description**
1	00:00	Narrative slide	Blue background is covered with brightly coloured squares which change colour and dance around each other. The text reads: "Sports is fun and really tiring".
2	00:01	Student footage	We see students playing rounders with a TA bowling. Several students stand in a square of cones and take a turn at batting, some use a rounders bat and others a tennis racket. We hear the cheers and encouragement of staff in the background, and a student discussing when and how to film with the researcher. Several animations are overlaid, including a "LIVE SPORTS" sign initially, and a confetti explosion towards the

Shot number	Start time	Shot type	Description
			end of the shot. The background music is an energetic, rhythmic guitar track, with bass and percussion elements which repeat as the music grows.
3	01:09	Text over footage	The text reads: “Playing fun football” over a series of colourful rectangles. As they disappear we see another “LIVE” sign, and a student taking penalty shots against the same TA. A teacher narrates the action, pretending they are in the (ongoing) World Cup. The student misses, and the music continues.
4	01:28	Text over footage	The text reads: “Legging it rounders” over a series of colourful rectangles again. We see a student swing a tennis bat, and an adult cheer as she hits the ball. The student starts to run, and the video stops abruptly.

13.4.1 Modes

The distribution of meanings across the different modes employed in this digital story is shown below in Figure 13-10. As a digital story about student experiences of sport, it mainly comprises observational footage that was filmed during a PE lesson, rather than footage in which people directly address the camera. Where speech is not used to directly to address the audience, it therefore serves other purposes. The inclusion of speech shows the interactions between me and the students filming, as we negotiate camera direction. This negotiation of filming practices is only seen more subtly through presenters’ gestures to those behind the camera in other Stories. Additionally, the interactions between staff and the students engaging in sports shows how they provide positive encouragement that promote enthusiasm and engagement in school activities. Although the use of text is similar to other digital stories, providing context and structure for the footage that follows, the content of the text is also more oriented towards student views and experiences. Rather than simply explaining what content is to follow in the proceeding video, the choice of words and phrases here are much more evocative of students’ emotions and experiences. Unlike other films, the text serves a double purpose in both providing context and expressing the priorities of students.

Students’ feelings as they play are also echoed in their gesture; for example, we see both the student and the adult’s shoulders drop in disappointment in shot 3, as the student misses the

penalty kick. We also see their enthusiasm for sport through the effort which they put into their actions: appearing to run as fast as they can to try to get a rounder or retrieve the ball while fielding in shot 1.

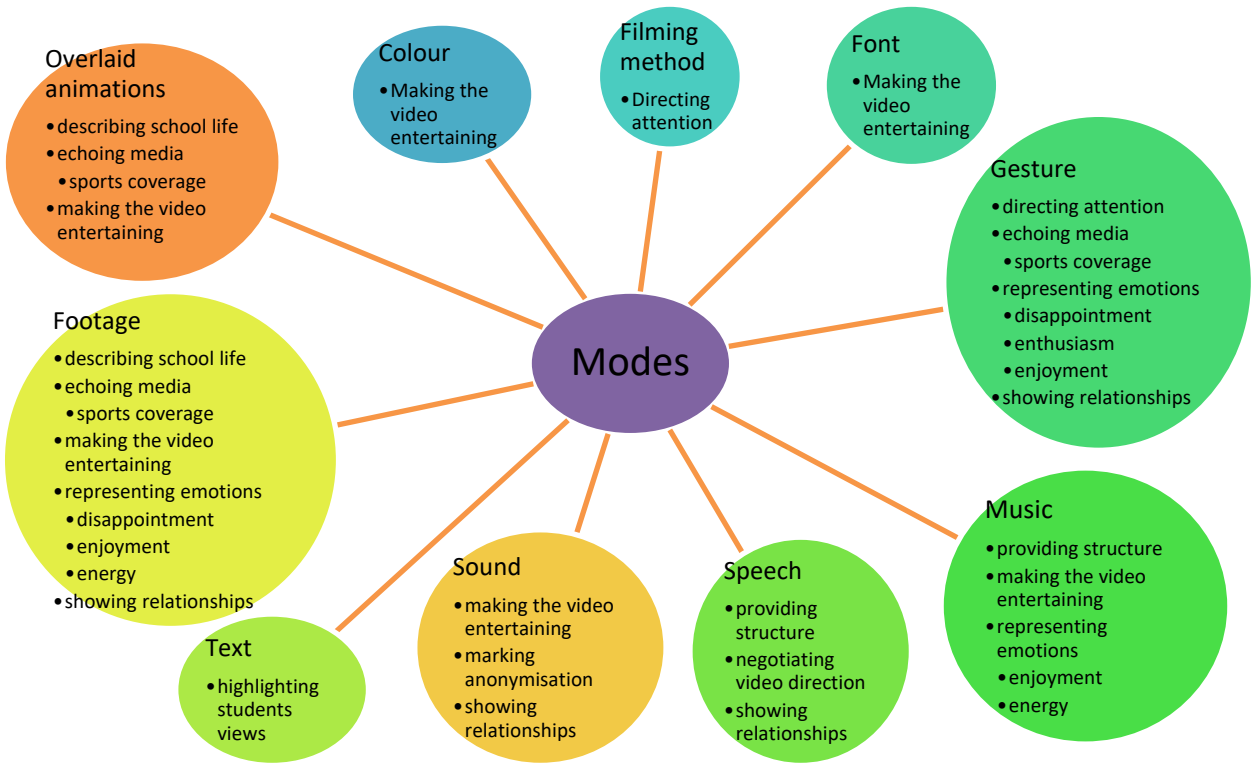


Figure 13-10: Mapping between modes and meanings in the Sports digital story

13.4.2 Composition

This video starts with a narrative slide, which introduces the theme for the digital story. This is followed by a clip of student video, featuring several different animations, and then two more clips which have text overlaid at the beginning of each of them. The distribution of modes across shots is given below in Table 13-8. Unlike the other digital stories, the way text is presented in terms of the font, colour, and transition animations is consistent across the three instances of text. This helps to unify the different video clips, creating a more coherent sense of students' experiences within Sports at Fairmead School. A selection of stills from the digital story, including stills of the text and some of the animations is shown in Figure 13-11.

Table 13-8: Distribution of meanings across different hot types in the digital story about Sports

Shot type	Shot numbers	Modes employed
Narrative slide	1	Text, font, colour, music, animation
Student footage	2	Footage, filming method, speech, sound, gesture, music
Text over footage	3, 4	Text, font, colour, music, animation, video filters, footage, filming method, sound

Figure 13-11: Screenshots from digital story about Sports

Once again, the types of knowledge which each mode communicates is somewhat complementary: the footage and sound from the video show the routines and experiences of students engaging in sport, and the text, music, font, colour, and animation supplement this with information about how students feel about these experiences. Again, a sense of fun seems to be central to what is experienced and conveyed, and there is an accumulation of this across the modes just mentioned. Together the use of these modes is amplified, in a way which emphasises the enjoyment that student co-creators wished to communicate through the digital

story. In particular, the use of overlaid animations in shot 2, including the use of balloon and confetti animations are emphasised by the joyful, energetic music, and the encouraging shouts from staff off screen. Overall, this gives the impression of sports as an energetic, positive, and exciting experience for students.

13.5 360° immersive videos

All the student co-creators who engaged in the first phase of the project contributed to the creation of the immersive 360° digital stories in some way, as they all wished to try using this novel technology. The filming of these digital stories was therefore organised during filming sessions such that individuals or groups could join to film a single digital story and then re-join the other student co-creators who were working on the other Stories. All bar one of these digital stories was filmed during the "Accessing the Community" sessions; the "DT & Science Room" Story was filmed during a lunchtime as another group used that classroom during the regular session. A summary of the immersive digital stories co-created with the students can be found below in Table 13-9.

Table 13-9: Summary of immersive videos, including details of content and student contributions

Location	**Description**	**Student Contributors**
DT and Science Room	Two students stand in the classroom in front of the students desks, behind a workbench. One introduces the room, and describes when they use it. The other student points out the whiteboard and the teachers desk to their left, and the first student indicates where their books are stored.	Tilly, Erin, Sammy, Connor
School Hall	Two students stand in the middle of the hall. One of the students introduces the hall and describes how it is used for lunch and for COVID testing. We hear the sounds of young children in the background from the nearby primary classrooms. The other student looks at her as she talks, then back to the camera as she finishes.	Stacey, Brogan, Sammy, Archie

Location	Description	Student Contributors
Key Stage 4 Classroom	A teacher and a student stand next to each other at the front of the kS4 classroom. The student introduces the classroom: “there’s lots of computers and it’s calm”. The teacher gives some more details about who uses the classroom, and some context for the new building coming the following year. The teacher and student walk out the classroom through the door at the back, and the framing of the video follows them.	Jason, Terry, Tilly
Library	Two students stand in the library. One of them talks to the camera, she introduces the library and talks about the many types of books which students can read. She gesticulates as she talks. The other student stands next to her holding a book, as an example.	Erin, Safiya, Sammy, Archie
Kitchen/Cookery Classroom	A student stands in the middle of the cookery room next to a TA in a mask. The student introduces the room and describes the “amazing recipes” the students make.	Poppy, Erin, Sammy

In contrast to the other digital stories, I completed the editing for these stories, as the immersive video could only be edited with complex software that require significant time to learn how to operate, and there was not sufficient time to train students how to do this.

13.5.1 Modes

The process of co-creating immersive video, and the technical complexity of editing it, meant that the students were not able to contribute to the editorial process. Consequently, meaning was embedded in fewer modes than the other digital stories. For example, these digital stories do not contain any music, overlaid text, or animations. There is also no variation in filming method as the immersive video requires the use of a monopod, which is not easily moved. Where filters are applied, they are to blur areas to remove images of young people who were not participating in the project. A map of how meanings are communicated in different modes is shown below in Figure 13-12.

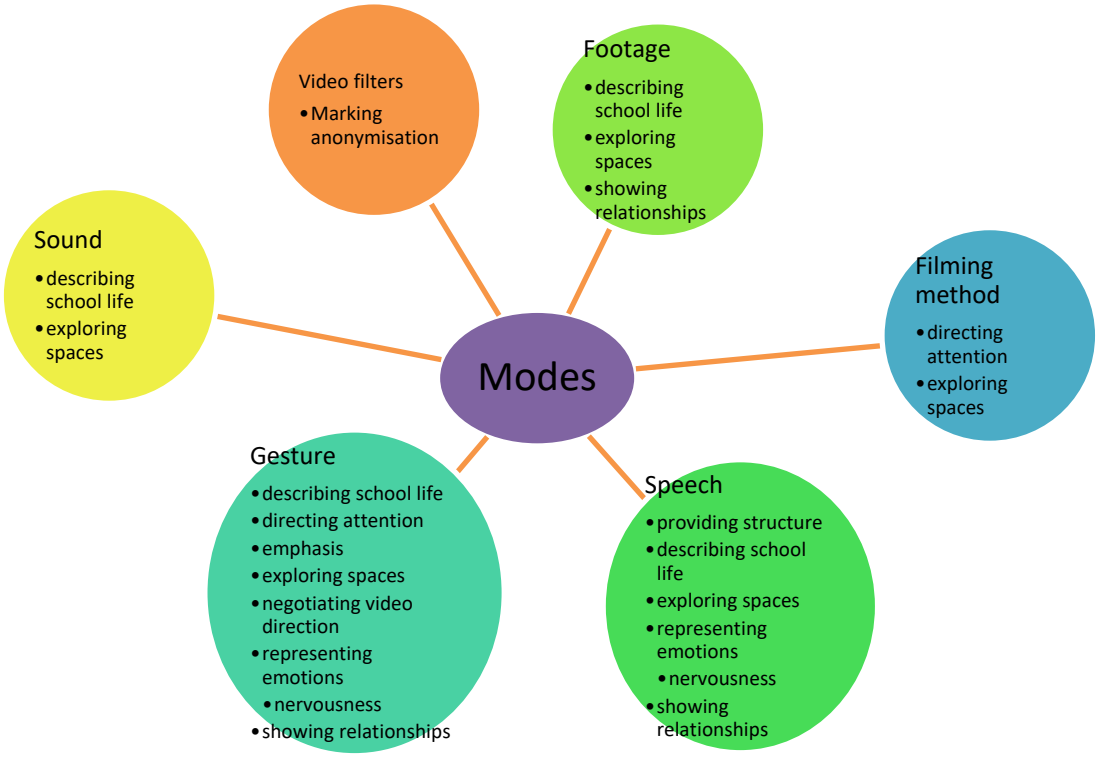


Figure 13-12: Modes and meanings map for 360° immersive videos

However, the way students directly address the audience means that these digital stories communicate a lot about how students experienced being presenters, and how they negotiated this role with those controlling the camera. For example, Erin's gesture in the DT & Science Room immersive Story, where she fiddled with the button on her polo shirt, suggested that she was somewhat nervous about presenting to camera. Nevertheless, that immersive digital story was the second one to which she chose to contribute to as a presenter. In this instance, the novelty and excitement of the activity was sufficient to overcome any discomfort or nervousness at the thought of being filmed, and the supportive, collaborative environment of the research project meant she could choose to engage in this new role in the way that best suited her, alongside some of her friends and peers.

13.5.2 Composition

Given the reduction in the extent to which students were able to contribute to the co-production of the editing process for these digital stories, there is a significantly reduced focus on entertainment and fun. Instead, these immersive Stories are more information-driven with the modes which have otherwise been used for adding interest and entertainment mainly left unused or used only for pragmatic purposes such as anonymisation. Consequently, these Stories lack the sense of fun which was accumulated from the music, sound effects, animations and text in other digital stories. Nevertheless, the students' voices are not entirely lost, as the

way they introduce each room and address the audience allows some insights into their experiences of interacting with each space. For example, Poppy describes the "amazing recipes" which students make in the school kitchens, and Jason references the calmness of the KS4 classroom.

13.6 Sign-makers and context

Having considered each of the digital stories in turn, and the immersive digital stories as a whole, I now focus my attention on what we can learn about the process of meaning making for these young people, relating to the sign-makers and the context. In this section, I draw upon materials from the first and second phases of the study, including researcher reflections, interviews, and outputs from the evaluation activities to explore how student co-creators made sense of the digital stories and their experiences.

13.6.1 New experiences of co-production

The opportunity to make digital stories combined collaboration with novel activities. The collaborative aspect of these activities was an element of the project which students reported enjoying during the reflective evaluation interviews:

> I liked making the Stories with my friends
> **—Sammy (reflective interview)**

Similarly, I noted the enjoyment gained from the complementary roles required for filming the immersive digital stories in my own reflections from one session:

> Two students stood in the middle of the hall and spoke about what happened, while another two helped me film, hiding behind a table tennis table packed away at the side of the hall. The students must have enjoyed it as the same group of students volunteered to help film the science room on Friday afternoon.
> **—Researcher reflection**

Despite their general enjoyment and the friendly, collaborative environment in which we worked, group dynamics were still at play, meaning that an important aspect of my role involved listening for quieter voices, ensuring that students understood the many ways they could contribute to sessions, and addressing student concerns about what we had done previously. For example, during the allocation of groups, I intervened to ensure that Poppy's preferences were accounted for, despite louder requests from another group:

> One group volunteered for sports, but a very quiet voice from the other side of the room said, oh we'll have to do another one then. I knew the quiet voice belonged to Poppy, who had suggested sports as a topic herself, and said it was the most important thing to her. I explained this to the other group, who quickly volunteered to do another theme: staff. Poppy was pleased that her group would be able to do the topic she felt was important.
>
> **—Researcher reflection**

The experience of being listened to strengthened our working relationship, meaning that when we came round to filming the content for the sports video, she was able to express more readily what role she wished to play:

> Poppy said she didn't want to be filmed as she didn't feel she was good at football, and so said she would like to help filming instead.
>
> **—Researcher reflection**

In this way, co-production in the form of co-creating digital stories gave students whose voices would have easily been lost an opportunity to contribute and have some control over not just how the school was depicted, but how they– as members of the school– were depicted through the digital stories.

The openness to other forms of engagement also proved to be a useful tool for others during the PE session that was filmed, as there were several students who did not want to take part in the group sports. It also provided a way for students to decide how they wanted to participate. The following quote describes how one student negotiated his own role in filming the sports session, having been involved as a presenter in other videos on previous occasions:

> Jason, who often has 1-1 support, did not join in with this, and Jayne (TA) tried to engage him in a different activity on the picnic bench under the canopy. He had enjoyed the filming yesterday, and so I asked him whether he would like to help me today. He said he would, and I asked whether he would like to be in front of, or behind the camera, he said behind. He helped me set up the tripod, I showed him how to adjust it to make it level, which he did.
>
> **—Researcher reflection**

The ability to choose how they contributed was clearly an important aspect of the student co-creators' experiences of co-production, which allowed them to mitigate the uncertainty that came with trying new or less familiar activities. Taking on the role of presenter, and being filmed for the digital stories seemed to be a particular challenge for students. Nevertheless, multiple

students chose to contribute as presenters, with many choosing to present different spaces for the immersive Stories:

> The students seemed to have enjoyed filming, and some of the students who had initially been cautious about being filmed had taken the leap to star in the films themselves. The novelty of the 360° camera helped with this, as they seemed to want to be involved, while we had use of it.
>
> **—Researcher reflection**

Overcoming the nerves associated with presenting also proved to be memorable for some students. One even responded that the opportunity to present had been one of her favourite aspects of the project:

> When I filmed, no, when I was in the hall saying about the test, covid test.
>
> **—Sammy (reflective interview)**

Another surprisingly memorable element of co-creating the digital stories for the students was the consent process. Multiple students highlighted the process of getting and giving "permission" as an important step in creating the digital stories, and this was evidenced in both the reflective interviews and the evaluation activity centred around recipes. Figure 13-13 and Figure 13-14 show some examples of the students' digital story recipes, where getting and giving permission to take part is the first step in creating the Stories.

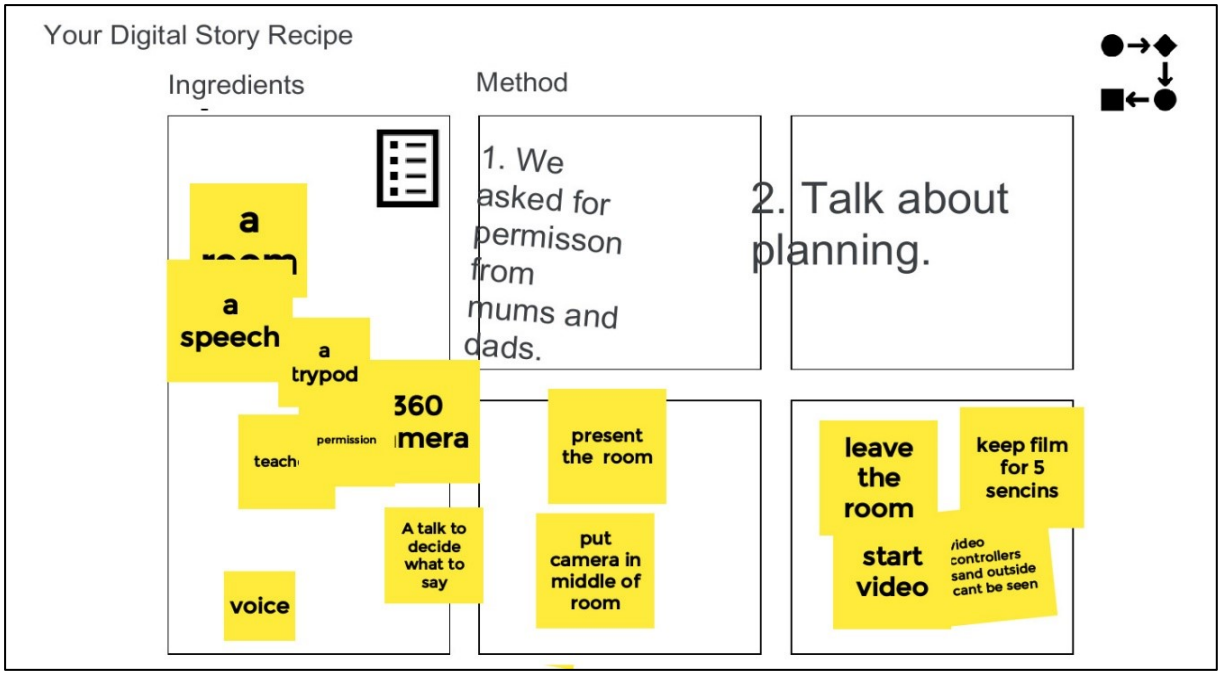


Figure 13-13: Jason's digital story recipe

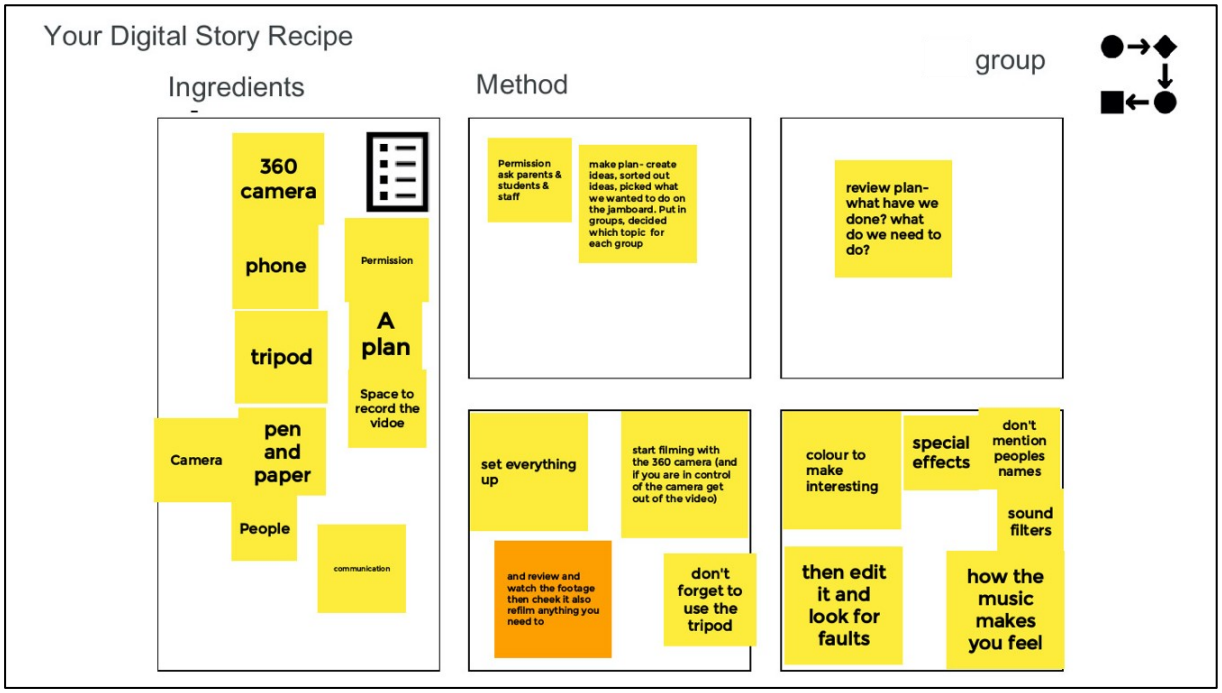


Figure 13-14: digital story recipe created by Archie and Jay

The extent to whichthe consent process is seen as an adult-centric process varies between them, however, with Jason highlighting the importance of permission from parents in Figure 13-13, and Jay and Archie emphasising that permission should be sought from everyone, including students and staff in Figure 13-14. Although the formal consent process which occurred at the beginning of the project was clearly an important step to the students, the ongoing process of consent meant responding to student concerns about both the process for creating the Stories and the final content. I have already mentioned the changes made to the digital story about teachers to ensure that Tilly was happy with the footage. The following quotations describe the process of negotiating the required changes to the video, and my own desire to ensure that she understood these actions as affirming, rather than undermining or stigmatising, her stims:

> We tried a few [different animations], and I went and got my mouse to make operating the laptop easier. Then she chose one which had a glow and sparkles, she said she liked that one, and I said it made her look like she was doing magic with her hands. She smiled, and agreed, saying it was cool. I said that fidgeting was a bit like magic sometimes, because it helped her to stay calm, and she agreed.
>
> **—researcher reflection**

> I felt that Tilly had found a solution to her discomfort with the video in a way which had been positive for her, rather than stigmatising. This was really important as I wanted

her to feel confident with the videos, and comfortable stimming at school (and in general).

—researcher reflection

This exemplifies how reviewing and amending digital stories provided students with opportunities to think about more deeply about their experiences, and to make changes that reflected their understanding. However, these examples also highlight the need to view consent as an ongoing process, whereby students can change their minds about what they are, and are not comfortable with, and where researchers should respond to these changes to ensure that we do more than play lip service to the idea of students' agency over the digital stories.

13.6.2 Students' lens of fun and entertainment

The students had clearly enjoyed contributing to the virtual tour and creating their digital stories.

—researcher reflection

This quote shows how my own reflections commented frequently on the fun which students had experienced in creating the digital stories. This understanding was confirmed in the second phase, where students explicitly described the project as a "fun experience" (see Ted's review in Figure 13-15) and asked about when they might use the cameras for filming again.

Um, when can we do the cameras?

—Tilly (reflective interview)

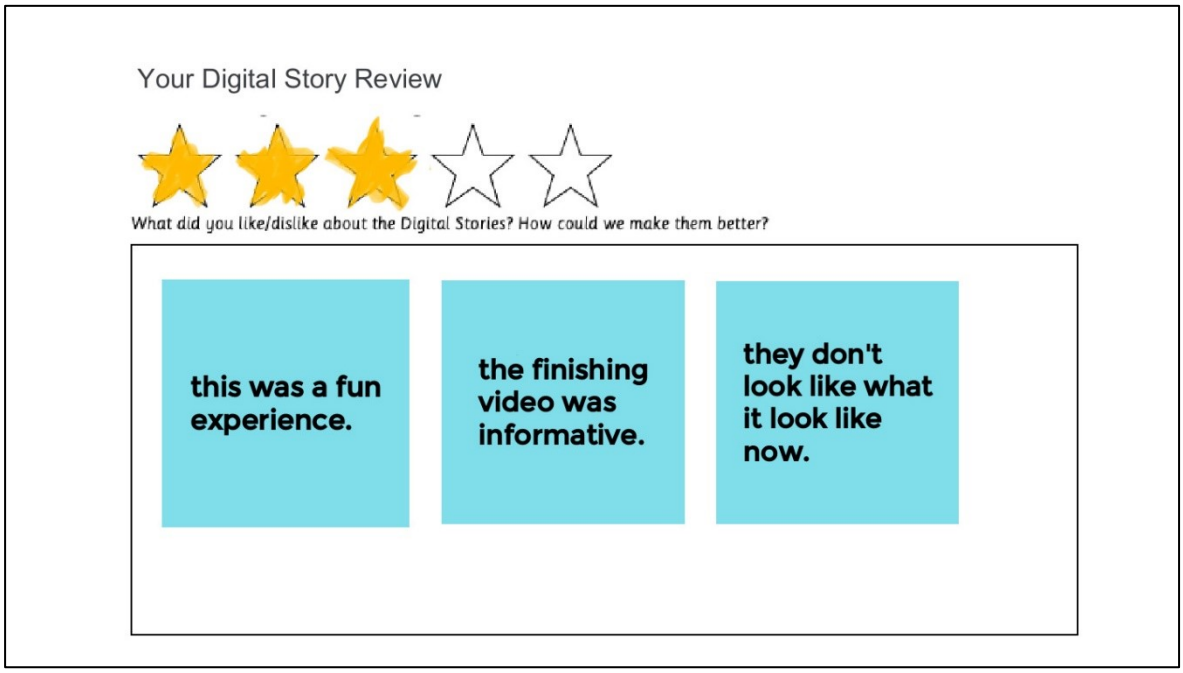


Figure 13-15: Ted's review of the digital stories

Furthermore, this sense of fun which students reported seemed to be mirrored through their reactions to watching the digital stories. In particular, fun was represented through the application of animations, where students decided to add animations for the purposes of entertainment for the audience, enjoyed the process of doing so, and experienced the animations and additional effects as entertaining. One student said the following about the additional effects available to them during the editing process:

> I got to mess around with a lot of stuff
> **—Jay (reflective interview)**

While another described why they had chosen to add the animations and music on top of their own footage:

> Because it's sort of like entertaining things.
> **—Tilly (reflective interview)**

Another described how the application of these effects made the sports video more entertaining, as it reflected the use of animations during media coverage of professional sports:

> ‘Cause it's, 'cause it's saying that it's live. That I think it's got a bit more than the others. When it shows people when they do sports, and also it looks like real sports when it's on live, when it's on telly.
> **—Archie (reflective interview)**

Furthermore, my application of sound effects to obscure and redact participant names was something which proved popular with many of the students, and this was noted in my own reflections, and in student interviews in phase two:

> I put the video of Josh on, and they watched it, they found it really funny to watch Josh introducing all the classrooms, and laughed loudly at the horn noise I had chosen to cover students’ names. At the end of the video they clapped
> **—researcher reflection**

> Um, my favourite digital story is when, um, someone was doing a video and um, Sir said his name and it was funny.
> **—Tilly (reflective interview)**

However, the use of editing tools was not regarded as being entertaining by all students, as one commented on the lack of colour in some of the shots from the digital story about classrooms, which had included greyscale filters:

> I liked how they were colourful, but what I didn't like was about the very recent one, like, I counted how many of them had colours in it and two of them had black and white-ish colours, which I didn't like.
>
> **—Jay (reflective interview)**

13.6.3 Digital stories as sources of information

As well as experiencing the digital stories as a source of fun and entertainment, it was clear that students' perceptions of the Stories were strongly influenced by their understanding that the digital stories were intended as a source of information for a wider audience. A substantial amount of the criticality which students engaged in during the evaluation phase related to the content and delivery of information within the digital stories. Specifically, students commented on the lack of clarity of speech in some of the digital stories, and highlighted the need to speak clearly as a key improvement for future stories:

> Speak really clear, and loud so everyone can hear, 'cause some of it you just can't really hear properly 'cause of the way the people speaking.
>
> **—Archie (reflective interview)**

They also discussed issues relating to changes in the school and described a limitation of the Stories as reflecting the school as it was at the time of making them, rather than as it was at point that students evaluated them. For example, Ted talked about how we had used their regular classroom for the digital stories, which was no longer used for teaching:

> I'll be honest some of the videos for the new buildings, most of them that we did it in are never used 'cause the building that we did it in before, which was our old classroom never got used afterwards, so I think it would have been better if we'd done it in a building that was still going to be used.
>
> **—Ted (reflective interview)**

This point was also reflected in his note on the review task, where he wrote "they [the classrooms] don't look like what it looks like now" (see Figure 13-15 above). Similarly, many of the suggested improvements to the digital stories related to activities and practices which were new or had returned since making the digital stories. For example, students suggested that improved digital stories might feature new spaces such as the breakout rooms and prefect room, and practices like School Discos which had returned with the relaxation of COVID-19 restrictions. However, one student suggested that videos could have been more explicit about the relationships between students and staff, in particular the ways in which staff interact with

students, offering them self-regulation strategies and comfort when required. He suggested the digital stories could:

> Perhaps talk about how some people deal with things, and how the teachers deal with the other students
>
> **—Alan (reflective interview)**

Despite these critical reflections on the potential for digital stories to communicate additional information which had been missed in the first phase of the study, one student, who had not helped in co-creating the digital stories, described how useful it was for him to access the digital stories. This was reflected in both the review activity (see Figure 13-16), and in comments he made during an interview:

> It made me less worried about coming back to school, and they were useful, and they showed people what was going to happen.
>
> **—Sean (reflective interview)**

This confirms the potential utility of digital stories as a source of information for a wider audience beyond the experiences of the student co-creators who contributed to their development.

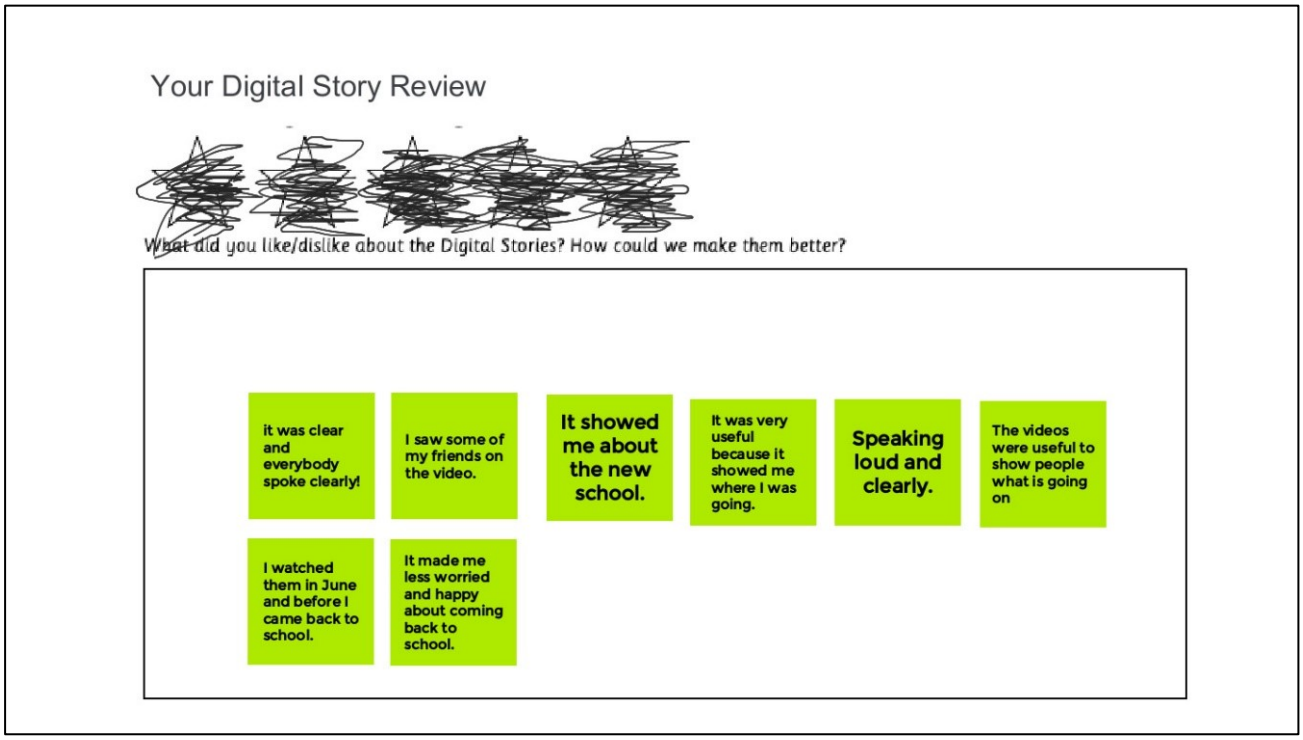


Figure 13-16: Sean's review of the digital stories

13.7 Linking to theory

Finally, this section of my analysis links the preceding data to the concepts of learning, agency, and collaboration, which I argue are key to understanding the students' experiences of making and consuming digital stories.

13.7.1 Multimodal learning in digital story co-production

Within multimodality, the concept of learning is seen as the remaking of signs whereby a learner uses the knowledge they have understood to create a new sign which communicates that knowledge in some way (Kress and Bezemer, 2015; Bezemer and Kress, 2016; Canale, 2019). Within the digital stories, we see students showing their own understanding of school spaces and routines. However, there are also examples where the digital stories captured the negotiation of roles, and the stages of planning to account for restrictions upon people's contributions. For example, some of the speech between me and the student filming in the digital story about sports demonstrates the student's conscientiousness about filming those who we did not have the appropriate permissions to include.

Additionally, the flexibility and openness to student contributions allowed opportunities to demonstrate their existing skills and strengths, and to develop new ones. For example, in a reflective conversation following one of the sessions, staff commented specifically on the ways students had shown leadership skills within their groups, demonstrated existing editing skills, and continued working without adult supervision following guidance from me. On another occasion, the collaborating teacher made the following comment about Jason's deep engagement and contributions during the session:

> For that young person it was more than enjoyable, it was an achievement.
> **—collaborating teacher reflection**

Furthermore, the evaluation activities and reflective interviews from phase two suggested that there was value in the knowledge which students gained from watching the digital stories to learn about a new environment. Specifically, there was some evidence from student feedback that these opportunities for learning may have reduced students' worries about vertical transitions into a new environment.

13.7.2 Agency and control in front of the camera

The novelty of the activities involved in co-creating the digital stories simultaneously had the effect of being both exciting and potentially unsettling for the students. Consequently, it was

important to provide scaffolding for all activities and to listen to students so that they were able to effectively make choices and practise their agency. The presence of scaffolding and staff who were able to model new activities, also meant that students were able to engage in roles that they initially lacked the confidence to try. During the first phase of the study, the collaborating teacher and I discussed the difficulty of providing the right amount of scaffolding to enable students to engage as deeply with the project. The collaborating teacher described this as a process of "leading the students down the garden path, but needing them to open the gate".

However, within the first phase of the study there are several examples of doing this successfully. For example, we see Safiya's confidence grow as she practised the role of presenting in different spaces in the digital stories about Classrooms, after seeing Josh (a TA) model this for her. Through this practice we see her behaviour change so that her movements are more outward presenting, and energetic, showing a greater confidence and awareness for the audience of the video. Similarly, Jason and Tilly both moved from roles behind to being in front of the camera while interviewing staff in the digital story about teachers. For Tilly, this was a step which built upon her earlier interactions with teachers behind the camera. Despite this scaffolded practice, the move to an on-screen role was still a big step, and one which she took with some trepidation. This trepidation was evident when discussing her discomfort with the digital story upon reviewing it in phase two. However, the experience of expressing this discomfort and then acting together to change it gave her another opportunity to practise her agency and make decisions about the way she was portrayed in the digital story.

13.7.3 Collaboration and students' voices

Although the students co-created all the video-based transition resources discussed here, the extent to which the Stories reflect student voices varies. The more limited nature of student participation in the creation of the immersive 360° videos is reflected in the more information-centred nature of these stories. Nevertheless, allowing students to choose where and how they presented these immersive 360° videos did leave room for some reflection of students' perspectives. By contrast, the digital stories gave a much clearer insight to students' views, experiences and everyday routines.

Despite the stronger presence of student voices in the digital stories, the attribution of perspectives to particular students is complex as the highly collaborative nature of the project blurs lines of authorship. The complexity of visualising attribution and authorship is shown below in Figure 13-17, which depicts a Venn Diagram relating student co-creators to the digital stories to which they contributed.

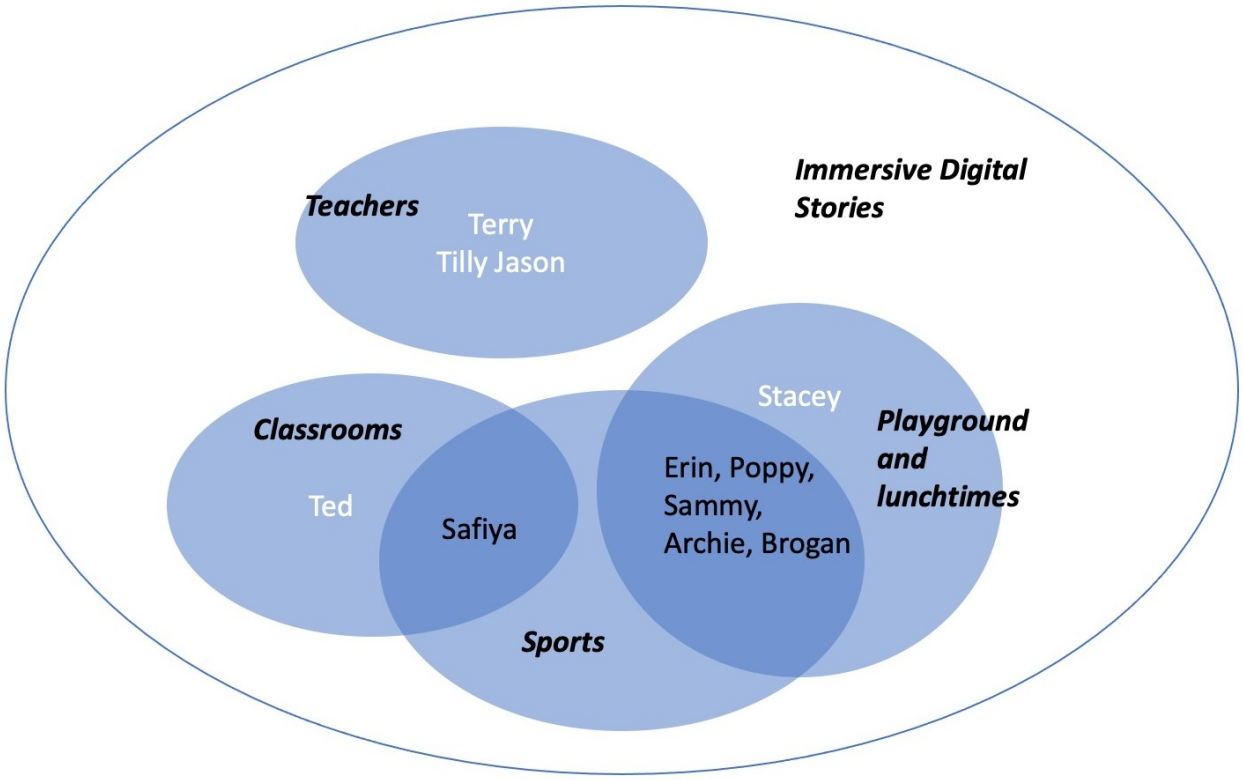


Figure 13-17: Student contributions across digital stories

Furthermore, although online tools such as Google Jamboards allow students to collaborate easily on shared documents, they also make it difficult to recognise individual students' contributions. While collaboration facilitates gathering student views as a group, it can also mean that quieter voices such as Poppy's could easily be missed. Consequently, it is important for adult facilitators to pay attention and respond as an active listener when students express their views.

13.8 Discussion and conclusions

This Part of the thesis has detailed the second research study completed with student co-creators at Fairmead School. This study consisted of two phases. In phase one, student co-creators developed digital stories and immersive 360° videos about Fairmead School in preparation for the new school year (September 2021), when the school would have an influx of new students and most teaching would move into a new school building. The second phase explored students' experiences of co-creating these digital stories and immersive 360° videos, and the utility of the stories as a transition support tool. This second phase was supported by evaluation activities based around the metaphors of recipes and reviews to scaffold student reflection on the digital stories and immersive 360° videos and the process of making them, as well as co-produced interviews.

The analysis drew upon the digital stories and immersive 360° videos which resulted from phase one, as well as my own reflective observations, reflective conversations with the collaborating teacher, and data from the evaluation activities and interviews. This analysis highlighted the value in co-creating digital stories as an opportunity for students to practice agency, which was demonstrated through students' enjoyment of the process. Once again, flexible collaboration which allowed students to choose how and when they wished to participate is closely tied to fun and agency. However, the conceptual and theoretical frameworks for agency, voice and collaboration introduced in Key concepts and theories fail to account for the importance of fun as a facilitator of student contributions to co-creating digital stories, this issue will be addressed further in Part Four.

Nevertheless, this study emphasises the importance of flexibility and supportive relationships with members of school staff, adding to the growing recognition of the way relationships provide important context and space to support the development of relevant skills needed to contribute to digital storytelling (Heron and Steckley, 2020; Harris *et al.*, 2022; Parsons *et al.*, 2023). The flexible approach to participation, alongside the scaffolding and support offered by school staff within the first phase of this study allowed students to engage in ways which they initially found uncomfortable or lacked confidence. Furthermore, digital stories give insights as to how students gained confidence through watching staff model activities, or initially choosing to engage in more comfortable ways and then building up to ways of engaging that were more challenging for them.

Additionally, the analysis highlighted the roles which adults had to play in recognising and supporting those students whose voices would easily be lost within the group dynamic. The role of adults and facilitators as active listeners who act upon students' views and requests is an essential element of managing collaborating with children to ensure that the process is equitable for all those contributing (Lundy, 2007; Heron and Steckley, 2020). Within the context of this study, responding to Tilly's concerns also gave me the opportunity to take action to reduce any shame or stigma she was experiencing when watching herself stim in the digital stories about teachers, by responding in a way which respected and valued her experiences. Although the purpose of this study was not to address negative and self-stigmatising views about neurodivergent characteristics, this anecdote reinforces the potential of digital stories as a neurodiversity-affirming methodology in line with other research highlighting the value of digital stories as a form of counter-narrative (de Jager *et al.*, 2017). Researchers have addressed this potential more explicitly in other fields, for example through the co-creation of digital stories to address the stigmatisation of children and young people relating to HIV status (Mnisi, 2015) and poverty (Kent, 2016).

In relation to the extent to which the study addressed its aims. This study provided promising evidence to support the usefulness of the digital stories as a transition tool to inform students about Fairmead School and the new school building. This is supported by strong evidence to suggest that students liked the videos and found them entertaining, echoing the positive attitudes towards the use of digital stories to support transitions found elsewhere (Parsons, Ivil and Kovshoff, 2020; Wood-Downie *et al.*, 2021; Lewis-Dagnell, 2022; Parsons *et al.*, 2023). Furthermore, this study represented an extension to the school's current practice using transition videos, by supporting students to contribute to digital stories about the topics which mattered most to them. The impact of this research within the wider context of the research-practice partnership is discussed in more depth in Part Four.

The main limitations of the study relate to the access to participants for the second evaluation phase. Though there were some students who engaged in both phases of the research, the group involved in the evaluation phase represented an incomplete sample of those who had engaged as co-creators in the first phase. Of those who were new to the study in the second phase, only one student had engaged with the digital stories as a transition tool. Nevertheless, the study provided some evidence to suggest that the Stories had been helpful in managing the students' worries relating to the transition into the new school building. These limitations were primarily caused by pragmatic factors relating to the convenience of collaborating consistently with the same teacher and navigating the negotiation of class time during which we could complete the evaluation. Though the close working relationship with school staff was essential for the conceptualisation and completion of this study, this limitation highlights that research-practice partnerships such as this one are not a panacea for the complex issues which arise when trying to conduct research within busy school environments.

In conclusion, this study adds to the growing body of research which explores the benefits of co-creating digital stories with neurodivergent young people. It highlights the opportunities which this process provides as a holistic learning experience, which simultaneously encourages both personal agency over how students engage and collaboration with others. Finally, it provides some evidence (albeit limited) for the potential usefulness of digital stories as tools which address students' concerns regarding vertical transitions into new spaces and educational settings.

Part Four Reflecting on the journey

14 Introduction

Figure 14-1 depicts our current position within the thesis, and how this final section draws upon the ideas, and findings from the previous three parts. The first three Parts have explained the ideological underpinnings and context of my Doctoral research, and reported the two studies that I conducted with the students and staff of Fairmead School.

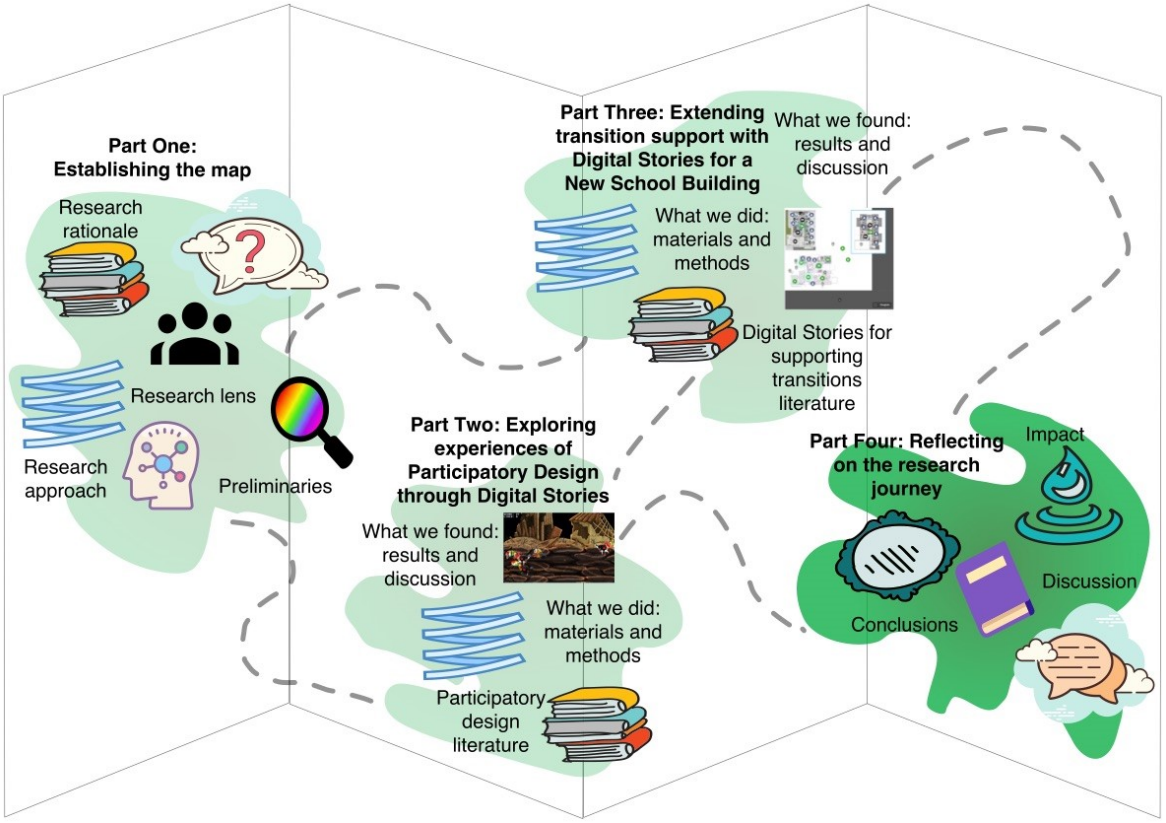


Figure 14-1: Positioning part four within the thesis map

Part One presented my research partner, Fairmead School, and described the demographics of their student population and context of my research within their wider development as a school. Part One also introduced the idea of digital stories as a form of co-production, which may provide a means to address the exclusion of autistic young people from educational research. The rationale for each study was introduced, positioning digital stories as a method for exploring autistic students' experiences of participatory design, and as a tool to support potentially stressful vertical transitions to a new school or building. I described my epistemological position, and how this relates to the key concepts and theories for my research namely: multimodality, agency, participation, voice, and collaboration. Finally, Part One set out the

participatory action research methodology and multimodal analysis approach which ran across both studies.

Part Two detailed the first study, which explored participatory design as an educational experience for autistic students using digital stories. The Background synthesised literature about how children have been involved in participatory design, and how autistic children have been included in (and excluded from) participatory design processes. Section 8 set out the materials and methods for the study, explaining how it was conducted during a timetabled enrichment session, or "coding club", with a group of KS4 students, support staff and technology industry professionals, who collaboratively developed a computer game "Birds with Guns". Section 9 presented the results, drawing on the students' co-created digital stories, my own reflective notes, and co-produced interviews. Finally, section 9.7 reflected on digital stories as method for representing students' views and explored how students benefited from adopting roles that reflected their strengths and interests within this participatory design process.

Part Three reported the second study, which investigated how students could extend existing transition support by co-creating digital stories about their school. The Background described how digital stories have been used to support autistic children and young people in vertical transitions, by creating resources which share knowledge and build interactional expertise. The background section then explained the context for the study relating to the opening of a new school building at Fairmead School. Section 12 detailed the process of creating and evaluating the digital stories, including reflective evaluation activities and co-produced interviews. The findings were presented which drew upon my analysis of the digital stories, my own reflective notes, and data from the evaluation activities and interviews. The final section positioned digital story co-creation as an open and flexible learning experience, which promoted collaboration between students and enabled students to demonstrate new skills.

This final part presents an overview of the outcomes and findings from the two studies, and how they relate to my research questions. Then, it considers how these findings can be brought together to inform my understanding of agency, participation and voice within intergenerational collaborations, and how centring students' perspectives might lead to new ways of thinking about co-production which contribute towards reshaping the narrative regarding the skills and strengths of autistic children and young people. I then discuss the influence of COVID-19 on my research journey, before reflecting on the research-practice partnership, and the ethical implications of adopting participatory research approaches. I consider the impact of the research in terms of inclusive dissemination activities, students' educational experiences, professional practice, and my own development as a researcher, before finally presenting my conclusions. Throughout this final part, I draw upon quotes to support my argumentation. Some

of these quotes are from evaluation interviews with school staff and others are comments made by Ben Crump (one of the senior leaders at Fairmead School) who has contributed his reflections on the school's involvement in both studies during public research dissemination activities.

15 Findings and outcomes from the first study: exploring the experiences of participatory design through digital stories

The central research question for the first study explored the insights which digital stories might provide into autistic students' educational experiences of participatory design. As described in 7.5 the aims of the first study were to:

- Use participatory design to co-create a computer game with students from Fairmead School
- Provide opportunities for students to learn about careers within the technology sector
- Explore students' experiences of co-produced research through their creation of digital stories

In section 8.5 I described the game which student co-creators made, "Birds with Guns", a retro-style shooter game in which players choose a bird character and shoot zombie-bird targets over a series of three levels, each with different student-generated zombie-bird opponents, backgrounds, and music. Students had the opportunity to meet with four technology industry professionals, who each told the students about their jobs and contributed to the design and development of the game. Through this interaction with professionals, students were able to gain meaningful insights about relevant careers in the technology sector, in line with the anticipated benefits which Fairmead School had initially expected from involvement with the study.

> This project has provided a brilliant opportunity to gain an insight into an industry, and to think that they would be able to talk to adults who are currently working in the coding industry is just fantastic. They've had guests come in and talk to them, and they've talked with great enthusiasm about their experiences, they have an understanding of what their future might look like and the role they might be able to take.
> (Crump, 2021)

Furthermore, through participation in the first study, students learned about programming, and the process of creating a computer game. For some students this learning has been carried

forward into new educational settings, while others have continued to pursue their interest through continued attendance of "coding club" enrichment sessions:

> Some of our young people have moved on to further education and have taken with them a deep interest in coding and game design, and some great experience. (Crump, 2021)

Teachers reflected that the experience of both interacting with industry and working collaboratively to build a game has created the type of employment-related learning experiences which the school was trying to promote. Specifically, they reflected on the advantages of providing experiences which gave greater insights into what careers involved, so that students can make better decisions about what careers they want to follow:

> That's what we're always striving to do at the moment with our careers program, to give them realistic opportunities so their aspirations are based on genuine experiences. **—Frank (Teacher)**

Students co-created digital stories about their experiences of working together to design the game, with different students taking turns each week to film sessions. I organised the footage, before students worked individually or in small groups to describe their experiences and create their final Stories by combining these descriptive phrases with footage, music and additional animations and effects. My understanding and interpretations of these videos were supplemented through my own reflective notes about each session, co-produced interviews with the student co-creators, and several adults who had also taken part.

The micro analysis of the digital stories highlighted the flexibility of the method, allowing students to represent their views according to their own priorities, rather than mine or those of the school staff. The status of the digital stories as multimodal artefact was key to this, as student co-creators could choose to supplement footage with music, animations, and text to communicate their feelings about a clip as well as information relating to what activities it depicted. The wide choice of semiotic resources which resulted from the audio-visual medium was therefore important to the agency students could practice regarding the expression of their experiences. Importantly, the agency of the young people through the process afforded accounts of participatory design processes which are less reflective of adult or neurotypical priorities and more strongly focused on autistic students' experiences. The process of creating the digital stories addressed a limitation of existing participatory design research which is the tendency to primarily address the outcomes rather than the process of participatory design (Parsons and Cobb, 2014; Bossavit and Parsons, 2017).

In focusing on the process of engagement in participatory design, my analysis highlighted the importance of fun and enjoyment to students' experiences. Indeed, the prevalence of high energy music, playful animations, and bright colours across several of the digital stories indicated that the fun which students felt and created within our sessions together was central to their experiences. The significance of fun was also reflected through their co-produced interviews. My analysis also emphasised the importance of agency and collaboration within students' experiences of participatory design. The collective nature of their effort, and the agency which was afforded to each student individually meant that student co-creators were able to participate in the ways they wanted, choosing how they contributed to individual sessions according to their priorities, strengths, and interests. In doing so, they were able to demonstrate their own knowledge and recognise the strengths and expertise of their peers. Narratives about how each student had contributed to the final game were prevalent across student accounts within the digital stories as well as the co-produced interviews. My own notes described student co-creators' pride and excitement upon integrating their creations into the game. Additionally, the analysis emphasised student co-creators' feelings of ownership and pride for the final game, which displayed what they had collectively achieved through each of their individual contributions.

16 Findings and outcomes from the second study: extending transition support with digital stories for a new school building

The research question addressed was: how can co-creating digital stories provide opportunities for agency, collaboration, and learning? As described in section 11.3 the aims of the second study were as follows:

- To co-create digital stories and immersive 360° videos with students about Fairmead School that reflected their priorities and interests
- To make the co-created digital stories and immersive 360° videos available for new and existing students before the transition into the new academic year in September 2021
- To explore students' views of the digital stories and the process of making them

In section 12.4 I described how students worked together to co-create digital stories and 360° immersive videos about Fairmead School. The analysis, presented in section 13, described and analysed the four digital stories which students co-created, and the five 360° immersive videos, which showed a selection of the spaces around the existing school building. These resources

were added to a virtual tour and made available through the school website in July 2021. The virtual tour also featured transition videos which staff made for each class as part of their existing transition support practice. Though the research did not fully investigate the impact of the digital stories and the virtual tour, there was some evidence to suggest that students had accessed them and found them helpful, and the potential utility of the digital stories was also recognised by school staff:

> We know a lot of young people have watched the videos, and a lot of them multiple times, so the better those are, the better the transition for them.
> **–Frank (Teacher)**

As in the first study, I conducted a social semiotic multimodal analysis, which began with a micro-analysis of the digital stories, and then drew on additional data from the evaluation activities, interviews, and researcher reflections. This analysis emphasised the fun which students experienced while creating the digital stories, and the enjoyment they felt from watching them. Furthermore, the analysis highlighted the agency that co-creating digital stories allowed students to practice because of the flexibility of collaboration, which allowed students to choose how and when they wished to participate. This flexibility, coupled with the scaffolding and support offered by school staff, allowed students to try new ways of contributing to the co-creation of the digital stories, and to cultivate and demonstrate new knowledge. In particular, the analysis recognised the role of staff in modelling and encouraging students to join them in front of the camera as "presenters" and reflected on both the trepidation and confidence of several students in doing this. In terms of other areas of knowledge, co-creating the digital stories allowed students to practice and enhance existing technical skills relating to filming and editing. Students also deepened their collaborative skills through ongoing negotiation of roles and responsibilities which was necessary to prevent duplication of effort and successfully complete the digital stories within the available time. Other researchers have noted the difficulty in getting adult professionals to collaborate effectively during co-production (Barke, Thomas-Hughes and Howard, 2020). Consequently, this evidence of growing collaboration is particularly significant.

17 Overall findings

Having briefly reviewed the findings from each study, I will now synthesise and connect them with the ideas from Part One. In section 3.2, I explored the definitions of co-production, drawing from Bell and Pahl's (2018) ideological view of co-production as a utopian approach consisting of values-based collaboration to create a more equitable world. Based on this definition, I identified agency, collaboration and learning as the core features of co-production, which were

explored within the two studies. In the following sections I reflect on the concepts of agency, participation and voice in intergenerational collaborations, and consider how our understanding of co-production as a learning experience might change by centring students' perspectives.

By drawing on this conceptual work, I aim to deepen understanding of the research experiences I presented above rather than provide universal models or conceptualisations. In doing so, I recognise the limitations of my research in relation to the heterogeneity of autistic young people and the diversity of their educational experiences. Within this research I have worked with a relatively small group of students from a single school in one geographical location, with similar support needs. Though the intersectional identities of students vary, the sample included in this research represent a slim insight into the wide breadth of autistic experiences, which naturally encompasses every other dimension of human diversity and intersectional experience (Botha and Gillespie-Lynch, 2022). Consequently, I aim to avoid accusations of partial representation by recognising the views and experiences presented within this thesis are not universal to all autistic young people (McCoy *et al.*, 2020). Rather, the claims I make here relate only to the experiences of the young people involved in my research, and may or may not extend to other autistic students engaging in other forms of co-production.

17.1 Modelling participation and voice in intergenerational collaborations

In section 4.2, I set out the key concepts underpinning my research. This discussed my understanding of agency as dynamic, contextual, and relational (Cornwall, 2008), and as something which is practised through participation (Moosa-Mitha, 2005). I also explained how a multimodal approach leads to wider conceptualisations of voice, which extend beyond expression of propositional knowledge encoded in speech or writing to encompass other forms of expression, echoing the notion of voice set out in Lundy (2007) based on UNCRC Article 12 (United Nations, 1989).

In 4.2.4, I link this conceptualisation to Griffiths *et al.*'s (2021) iterative building-block framework for collaboration in education, by mapping factors across the two models (this is repeated in Figure 17-1). However, in linking these two models I feel I have downplayed the cyclical nature of collaboration as set out in Griffiths *et al.* (2021), and the reciprocal relationship between agency and context (Moosa-Mitha, 2005; Moran-Ellis, 2013).

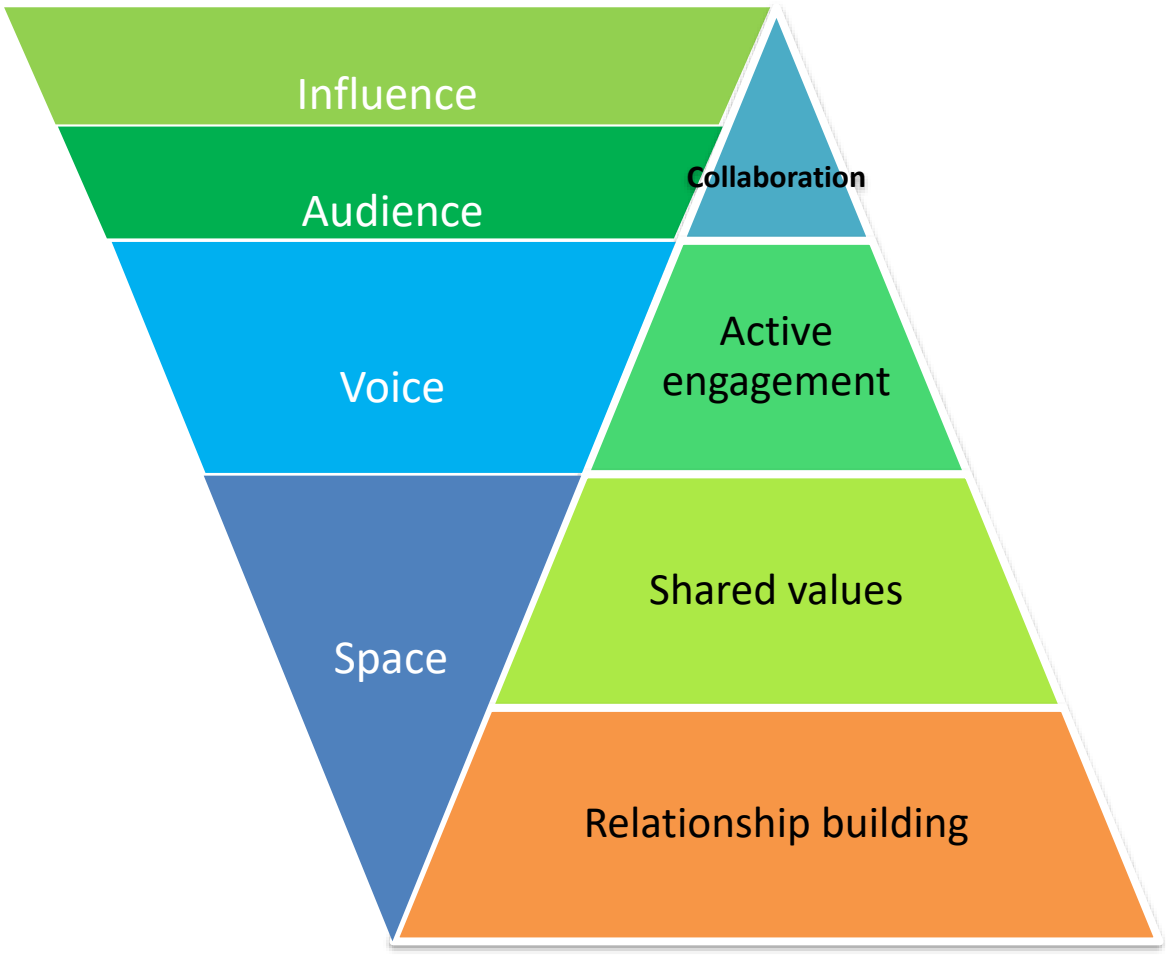


Figure 17-1: Factors facilitating children's participation within intergenerational collaborations

Consequently, in Figure 17-2 I present a new model of agency within intergenerational collaboration, which reflects the more nuanced interplay between agency, collaboration and voice within the accounts of student participation across the two studies. Although the factors included in Figure 17-1 and Figure 17-2 are the same, the mapping and relationship between each of the factors is different. In the following paragraphs I explain this new model, and how it reflects my findings from each study.

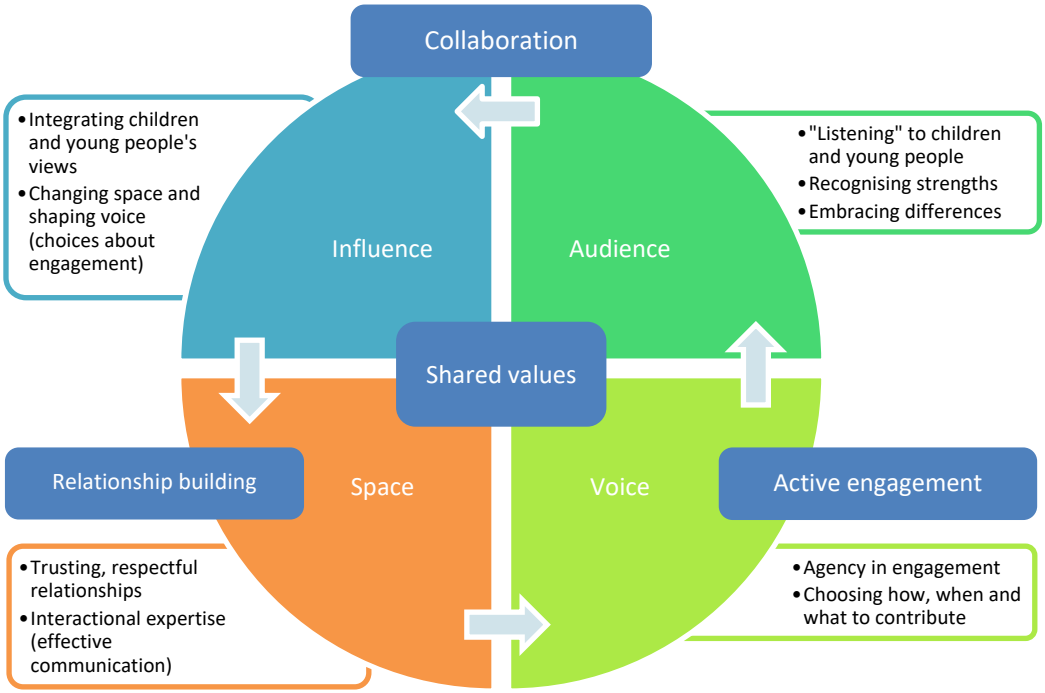


Figure 17-2: Factors influencing the intergenerational collaboration

Shared values sit at the centre of this new model of agency and voice in intergenerational collaboration. This decision was made to reflect the reciprocal relationship between values and action whereby shared values drive both individual and collective action, which in turn reinforce those shared values. As a researcher, values inform what questions I ask, and how I attempt to answer them, and for educators they inform the purpose, content and manner of teaching. As described in Part One my research is informed by the difference-centred and strengths-based values of the neurodiversity movement (Kapp *et al.*, 2013; Pellicano and den Houting, 2022), as well as the inclusive values of action research (Stringer, 1996) and participatory action research (Greenwood, White and Harkavy, 1993; Cahill, 2007). Though these values may not have been explicit at the beginning, students and staff appeared to adopt and behave according to these values as the research progressed. For example, in Part Two I reported how students had grown to recognise their own strengths, as well as the strengths of others, and within Part Three I described how Tilly and I were able to work together to create a digital story which affirmed the stimming depicted on video. Similarly, one teacher recognised how their own attitudes towards student agency had changed through their involvement in the research:

> … You're doing something for young people, but it doesn't mean that *you* don't have to do something *for* young people, *they can do it for themselves and for each other.*
>
> **—Frank (Teacher, emphasis my own)**

As in both Lundy (2007) and Griffiths *et al.* (2021), *space* and the relationships which shape them were important elements of my research. Within 9.5.1 I highlighted the value which

students gained from this space to choose how they wished to participate, and in 13.7.2 I discussed how this space meant students were able to try new ways of participating in front of the camera and grow in confidence as they did so. Although both studies physically took place in school, and during school time, the status of the activities as research rather that other forms of schoolwork was marked by my presence as a researcher, and the changes in practice which I modelled to other adults supporting the studies. Consequently, it was essential that I built relationships with students that allowed them to practice their agency, giving them the opportunity to say "no" to some ways of participating so that they could find new ones that better suited them. My presence as a researcher and creator of wider spaces for student agency and voice was also noted by staff supporting the studies:

> Having autonomy in their decision making is something that Verity has really brought with her.
> (**Crump, 2022)**

Within the *space* that is shaped by researcher-student relationships, and underpinned by shared values, students can *decide* to participate, practising their agency to enact Lundy's (2007) notion of *voice*, and Griffiths *et al.*'s (2021) idea of *active engagement*. Lundy (2007) emphasised the need to accommodate the many ways in which children and young people may choose to express themselves, which is protected within UNCRC Article 13 through the right to freedom of expression (United Nations, 1989). Within the multimodal nature of digital stories, students could incorporate meaning across different modes, such that they could step away from neuro-normative adult expectations of what and how they wished to communicate. In dissemination activities, adults noted the disparity between what students had produced, and what they had expected, highlighting the need to use methods which address students' views in ways which reflect students' priorities and interests:

> The videos they produced were not what I had in mind at all. If I'd done that adult thing of 'hey I know what you want' they would have not got what they want.
> **(Crump, 2021)**

Both studies gave students the opportunity to express themselves in terms of the content of the digital stories and the computer game, but they also gave students the opportunity to practice agency and have a *voice* in how they participated in each session. The complex nature of digital stories and computer games as multimodal artefacts meant that there was

flexibility in the roles which students chose to fulfil each week, and adults noted the difference that this agency had over students' approaches to participation:

> We were giving much broader choice. Young people were choosing what roles they were taking on, therefore they were comfortable with what they were doing.
> (Crump, 2021)

Similarly in terms of *audience*, the studies can be understood as providing internal and external audiences. On the one hand, the collaborative nature of participatory design and the co-creation of digital stories created an internal audience of peers, staff and other adults who worked with students to produce the outcomes of collaboration. When discussing the participation of one young person, who experienced challenges communicating through speech, one teacher observed the validation of the participatory, multimodal approach from this internal audience:

> It's not so much about communication, but it's about having an active role within the group, and being valued, isn't it?
> **—Frank (Teacher)**

On the other hand, the status of digital stories and computer game as meaningful multimodal digital artefacts also meant that they could be shared external audiences, such as other staff, parents and other stakeholders who had not directly contributed to either study. I discuss further how students have been involved in disseminating research findings with external audiences in section 18.4.

Finally, the underlying *values* within my research encouraged adults to respond to students' *voices*, ensuring that they were able to *influence the* processes of participatory design, the co-creation of digital stories, and the outcomes from them. Although some of this influence was negotiated and facilitated by adults supporting the project, students also had to compromise and work with each other, allowing each person to have a say over what they co-produced. For example, in 9.6.1 I described how students were happy to accommodate Poppy working on the digital story about Sports so that she was able to have more influence over the digital story that had been her idea originally. Within 9.5.4 I discuss the significance felt by Jay in seeing his idea realised within "Birds with Guns" and reflect on my role in adapting plans to incorporate his ideas within a temporal context which limited how many could be included. As in Figure 17-1, within Figure 17-2 the process of collaboration encompasses both *audience* and *influence* reflecting the dynamic and relational nature of agency manifested in shared decision making and collective action. Importantly, the cyclical, recursive nature of the agency and voice in intergenerational collaboration is here represented more explicitly with arrows. Within the

context of my research, students' agency was shaped by the physical, and socio-cultural context of the research taking place in a school environment, and by the relationships with myself, school staff and each other. However, through engagement with the studies, students also changed those relationships, and shaped the school and its practices, pushing them to further embrace the shared values which brought Fairmead to engage in the research-practice partnership to begin with.

> Working on this project with Verity, this idea that we ask young people how they want to approach things, which sounds like a really obvious thing to do, was… I'll say a revelation.
> (**Crump, 2022)**

17.2 New perspectives on co-production

While the model presented in the previous section accounts for the interplay between factors which facilitate agency, participation and voice within intergenerational collaborations, it does not fully reflect the findings I have presented within the studies detailed in Part Two and Part Three. While the previous section reflected on the conceptual links between agency and collaboration, it is also important to consider the extent to which the studies have met the ideological objectives of co-production, as set out in section 3.2. Across both studies, my analysis highlighted the complexities of engaging in co-production within formal educational settings, and the opportunities which might arise from focusing on students' perspectives. The following sections explore the idealistic intentions of co-production within these studies, their parallels to computational empowerment, and how recentring students' perspectives might offer new opportunities to explore the reconceptualization of co-production as a process of playful learning.

17.2.1 Current idealistic definitions of co-production

As outlined in section 3.2, this thesis has drawn from Bell and Pahl's (2018) utopian intentions for co-production, based within agency, collaboration and learning, as a route to a more equitable future. This section considers the evidence for each of these characteristics, and their contribution in making progress towards wider social justice aims.

As outlined in sections 15 and 16 , there is evidence that student co-creators practised agency through flexible engagement with activities within both studies. Accordingly, I have described how students did this through choices about how they engaged with activities. The analyses in sections 9 and 13 suggested the importance and value of opportunities for students to practise

their agency at school. Moreover, the extent to which students successfully practised agency is also evidenced through their reported enjoyment, and the centrality of fun within outcomes of each study, namely the digital stories, co-produced interviews, and, of course, "Birds with Guns". While the opportunities for agency were inevitably somewhat limited within a school-based environment, this finding is nevertheless promising; particularly so, when agency is positioned as the first step towards collective action and liberation, as it has been within participatory design research (Gautam and Tatar, 2020). Though the scope of this work does not include the full and systematic evaluation of each studies' impact that would be needed to assess evidence for progress towards wider collective action, there is some indication that the scope of student co-creators' agency was extended to other contexts (as discussed later in section 19.1).

Both studies provide evidence for collaboration, facilitated by the intergenerational relationships between me, the students and the staff supporting each of the studies. Within this context, students appeared to adopt the difference-centred and strengths-based approach I have advocated for throughout this thesis. The collaborative aspect of students' experiences is important to emphasise as it contributes to creating narratives which counter the common perception that autistic people struggle with collaboration and working in a team (National Autistic Society, 2016). As the lead teacher and collaborator from Fairmead said:

> The collaboration aspect is fantastic for our young people, who at times struggle with that aspect of learning within a group. Working together to develop ideas and then work towards agreed goals is a fabulous thing to see them doing.
> **(Crump, 2021)**

With respect to student's learning, I have adopted a multimodal perspective informed by social semiotics (see 4.2.2 for more details). Multimodal theory situates learning as an embodied experience through which learners come to understand new meanings and remake them through their own sign-making processes (Kress and Bezemer, 2015; Bezemer and Kress, 2016; Kress, 2018; Canale, 2019). Translated to the terminology of Heron and Reason (1997), which explicitly acknowledges the need to incorporate different ways of knowing within participatory research, learning is reframed as a transformational process through which embodied experiential knowledge is recreated as propositional (linguistic), presentational (artistic), or practical (behavioural) knowledge. Consequently, the reflective interviews, co-created digital stories (in the case of study one), and evaluation activities (in study two) provided an essential opportunity for students to recreate and communicate their embodied experiences of co-production.

In terms of practical knowledge, student co-creators' prolonged engagement across multiple sessions has evidenced their ability to practice agency and collaborate across different activities and contexts. Negotiating shared activities in a way which promotes individual agency as well as collective action is a key skill within co-production which often requires training and support to develop (Thomas-Hughes and Barke, 2018; Barke, Thomas-Hughes and Howard, 2020), and so students' success in this area is a further promising finding. Furthermore, teachers and support staff noted the significance of practising and enacting the skills associated with co-production for individual students:

> For that young person it was more than enjoyable, it was an achievement.
> **—collaborating teacher reflection**

Across both studies, students were engaged in the creation of new digital artefacts. Within the first study, students designed and developed "Birds with Guns" as well as co-creating digital stories about their experiences of participating. Within the second study, students co-created the digital stories and 360° immersive videos about Fairmead School. The technological basis of both participatory design and digital story co-creation activities allowed student co-creators to experience using new software and technologies. Moreover, by choosing to participate in activities requiring digital skills (such as programming, music production, graphic design, videography and editing), student co-creators were able to demonstrate practical knowledge within the technological domain, and describe how they did this within reflective evaluations:

> It [the project] was definitely interesting. Very fun, to see how coding actually is. All the little parts, and it was just very, um, talking to friends about how it all works, and... Like I was talking to [name redacted] about all the music, and where we should put all the music and stuff.
> **–Kobi (student co-creator study one)**

As a result, there is evidence for both studies offering student co-creators opportunities to learn a range of skills, through collaborative participation in a range of technology-focused activities.

17.2.2 Technology-focused co-production and computational empowerment

Although student co-creators' experiences did align with the core characteristics of co-production, the nature of students' learning across both studies also closely paralleled the goals for computational empowerment projects originating within educational applications of participatory design. As outlined in section 7.2, the purpose of computational empowerment is to promote students' participation in developing technologies, so that they are equipped to shape the direction of our increasingly digital world (DiSalvo and DesPortes, 2017; Iivari and

Kinnula, 2018; Dindler, Smith and Iversen, 2020; Iivari, 2020; Göbl, Guenther, *et al.*, 2023). While the first study involved a holistic exploration of students' experiences of participatory design within an educational context, the second study stepped away from participatory design by focusing on the process of digital story co-creation. Consequently, the comparison to computational empowerment may appear to stretch the original use of the term, which explored the educational potential of participatory design as an approach to technology-related learning (Iversen, Smith and Dindler, 2018).

However, computational empowerment has since been repositioned as an alternative process to participatory design that builds upon participatory design in terms of the values, methods and language needed to articulate the complexity of supporting effective individual participation within wider liberatory goals (Dindler, Smith and Iversen, 2020; Göbl, Guenther, *et al.*, 2023). Within this context, Dindler *et al.* (2020) emphasised the need for both creative and analytical processes within computational empowerment, which can support learners to develop the competence to influence and understand the impact of new technologies.

Considering these processes within my doctoral research, the first study examined both the process and outcomes of participatory design, employing digital stories and co-produced interviews within evaluations. While I facilitated the participatory design process, the influence of student co-creators on "Birds with Guns" is clear, evidencing their engagement with the creative aspect of computational empowerment. Additionally, the participatory approach to exploring student co-creator's experiences allowed them to engage with the analytical processes which encourage critical reflection on technologies and their design (Dindler, Smith and Iversen, 2020). Consequently, student co-creators were positioned as process-designers (Schepers, Dreessen and Zaman, 2018b; Schepers *et al.*, 2019) influencing the content, focus and implementation of reflective evaluation interviews and digital stories.

In contrast, the second study was positioned as exploring the process of co-creating digital stories rather than participatory design *per se*. Nevertheless, the strength-based and participatory nature of digital story co-creations follows the same non-hierarchical, process-oriented, and experience-based approach which is central to computational empowerment (Göbl, Guenther, *et al.*, 2023). Furthermore, the co-creation of digital stories fulfils the requirement for a creative component to learning, shaped by the intentions for the resulting digital stories as digital resources to support current and incoming students with the transition into the new school building. Furthermore, the reflective evaluation activities, which explored the process of co-creating the resources as well as their efficacy, allowed students to engage critically with the digital stories and 360° immersive videos from a more analytical perspective. Student co-creators' participation in and influence over reflective evaluations is positioned as

vital for computational empowerment, which requires both creative and analytical engagement with technologies (Dindler, Smith and Iversen, 2020).

Subsequent work has tended to focus on the conceptual characteristics and goals of computational empowerment rather than its methods, exploring how computational empowerment might be facilitated in formal educational settings (Göbl, Duvivié, *et al.*, 2023; Göbl, Guenther, *et al.*, 2023). To that end, Göbl, Guenther, *et al.* (2023) have characterised computational empowerment in terms of its vision, approach, and impact. In terms of vision, computational empowerment builds on the ideals of participatory design to enable learners to individually practise agency, implement collaborative decisions and work towards transforming oppressive societal influences (Göbl, Guenther, *et al.*, 2023). With respect to my own work, the strengths-based and difference-centred approach is intended to counter the common deficit-focused narratives and systematic marginalisation of autistic children and young people, as described in section 3. This is well-aligned with the political motivations of the early idealist developments of participatory design, which sought to create more democratic work environments that recognised and promoted each workers' expertise (Kyng and Mathiassen, 1982; Floyd *et al.*, 1989; Kensing and Blomberg, 1998; Robertson and Simonsen, 2012).

Unlike most contemporary schooling, computational empowerment requires a non-hierarchical, process-oriented, and experience-based approach that results in changes to learners' individual agency, group relationships and societal influence (Göbl, Guenther, *et al.*, 2023). While the student co-creators were successfully supported to practise agency over their contributions within both studies, there was still evidence of tensions between school norms and students' agency , as noted in researcher reflections on staff expectations and attitudes towards students' engagement with planned activities:

> All the activities should be voluntary, but allowing students to choose to do nothing is looked down on by school staff who want to see students engaging with the activities offered.
>
> **—Researcher reflection**

The tension between student agency and school norms has been noted within computational empowerment research, which recognises the more agentive role for learners as a marked change to the standard model of education that positions teachers as authoritative leaders and students as compliant followers (Göbl, Duvivié, *et al.*, 2023; Göbl, Guenther, *et al.*, 2023). This perceived tension is exacerbated within secondary school contexts, where an ever-increasing focus on student attainment encourages more rigid teaching practices, using didactic approaches which do not allow students the space required for more agency over their learning (Holloway, 2018; Johnston, Wildy and Shand, 2022). The perceived dichotomy between

students' agency and curriculum requirements was noted by teachers during dissemination activities of my research:

> It's not always very easy to do when you're teaching certain subjects where you have accreditation at the end and you have certain goals that you have to meet, but there is room, there is a lot more room than I think we recognise for this autonomy that we've seen. And being able to agree what their roles have been, and matching their roles to their strengths has been a real eye opener for us.
> **(Crump, 2021)**

In anticipation of the potential conflict between student agency and schooling, student co-creators' engagement with both studies was mindfully positioned as research, sitting somewhat outside the norms of their normal lessons. This echoes the idea of the "third space" which is discussed within participatory design (Muller and Druin, 2012; Makhaeva, Frauenberger and Spiel, 2016) as well as co-production and collaborative research more widely (Facer and Enright, 2016; Bertilsdotter Rosqvist *et al.*, 2019; Parsons, 2021; Lewis-Dagnell, Parsons and Kovshoff, 2023). My presence as a researcher within the classroom (either physically or virtually) may have contributed to establishing different norms within the shared space, where my presence marked a break from normal classroom practices for both students and staff. Nevertheless, the context and timetabling of research activities was also an important factor in establishing the space needed for student agency. Although studies were conducted within the normal school day, both studies were timetabled outside of subjects with strict curricular demands, where students may have already been accustomed to practising increased agency over learning.

Logistically, the allocation of school time to research could not have been achieved without the support and cooperation of senior leaders at Fairmead School. In recognition of the difficulty in allocating time and resources to computational empowerment (Göbl, Guenther, *et al.*, 2023), I consider the co-production space which facilitated student co-creators' effective participation across the studies, to be a function of the strong research relationship with individual students, senior leaders, and the school community more widely. Consequently, these studies have exemplified the potential benefits to investing time generously in research-practice partnerships so that the knowledge which results is reflective of researchers' deep participatory engagement with school partners (Parsons and Kovshoff, 2019; Parsons, Ivil and Kovshoff, 2020; Parsons, 2021).

While recognising the complex factors which have contributed to student co-creators' participation within this research, questions remain about how similar opportunities might be created in formal education without the presence of a researcher (Göbl, Guenther, *et al.*, 2023).

Without solutions to this issue, the expansion of computational empowerment across formal education more widely is not sustainable or feasible. Similarly, wider adoption of computational empowerment in schools would require additional methods of documentation and assessment. Based on the findings of the first study, digital stories might have some potential as a tool to support teachers gaining deeper insights into students' perspectives on computational empowerment. Although written reflections by both students and teachers have been suggested as strategies for both documentation and assessment (Göbl, Duvivié, *et al.*, 2023), digital stories may provide a more flexible and inclusive alternative, though research is needed to explore the feasibility of this.

In terms of the impact of computational empowerment, learners who engage in computational empowerment should be able to critically reflect on their own agency within daily technology usage, in order to increase their potential influence over digitalisation and technology development (Göbl, Guenther, *et al.*, 2023). Despite recognising the importance of understanding the long-term impact of computational empowerment (Iivari *et al.*, 2023), the long-term impact of this research is beyond the scope of the thesis. Nevertheless, adults' responses to the resulting technologies indicate that the technological outputs have the potential for positive influence on perceptions of autism. Both "Birds with Guns" and the digital stories demonstrate student co-creators' capability, creativity, and sense of humour, as suggested by the following quote from one of the teachers who supported the first study:

> ... it's something that they came together and created, they've designed it, and I think it's a real reflection of, of their kind of personalities, their creativity, but also their humour.
>
> **—Scarlet (teacher)**

Consequently, there may be potential for the outputs of technology-enhanced co-production with autistic children and young people to reshape prevalent discourses about autism, by countering misconceptions and deficit-focused narratives which might otherwise serve to further limit and marginalise autistic children and young people from participation and decision-making in research and practice.

17.2.3 Insights from student-centred perspectives: future opportunities for reimagining co-production as playful learning

Across both studies, my analysis highlighted enjoyment and fun as central elements of students' experiences, and this was discussed in sections 9.5.3 and 13.6.2 respectively. The following quotes, and the reflections presented in the evaluation activity depicted in Figure 17-3 emphasise the centrality of fun to students' experiences:

When we were doing that I really, I just couldn't wait for Friday.

—Jay (student co-creator, first study)

I think it was the best, the best

—Andy (student co-creator, first study)

Um, my favourite digital story is when, um, someone was doing a video and um, Sir said his name and it was funny.

—Tilly (student co-creator, second study

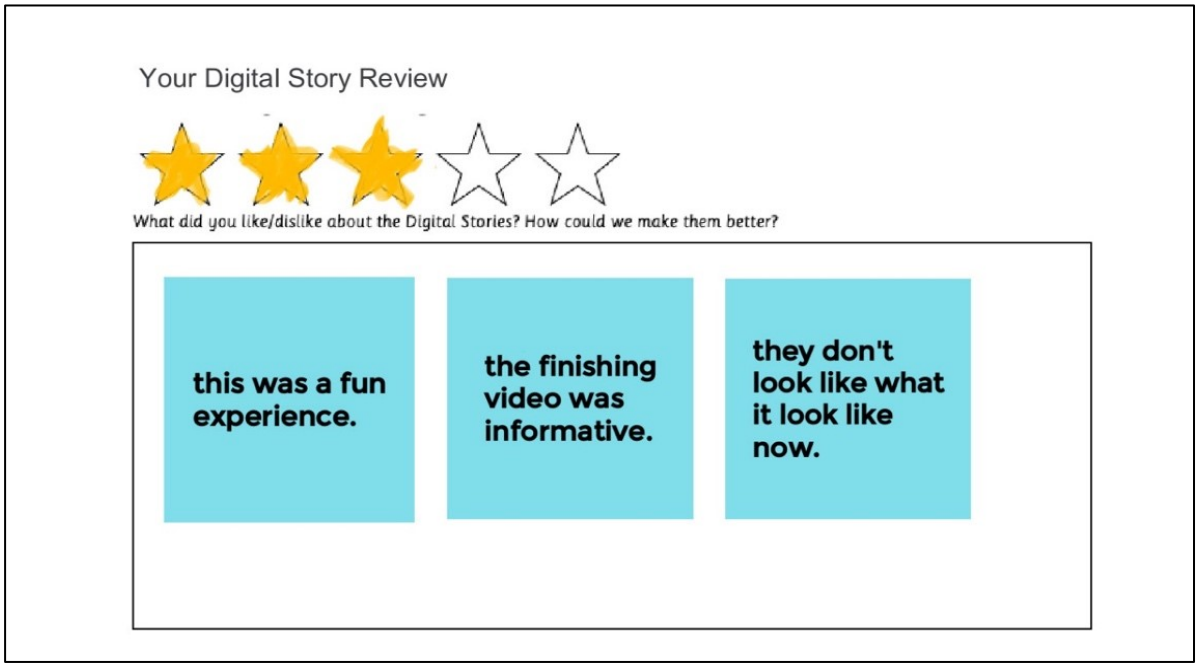


Figure 17-3: Ted's review of the digital stories (student co-creator second study)

Though enjoyment has been recognised as a key element within computational empowerment (Göbl, Guenther, *et al.*, 2023), current accounts of co-production are centred around agency, collaboration, and learning (Facer and Enright, 2016; Bell and Pahl, 2018; Barke, Thomas-Hughes and Howard, 2020; den Houting *et al.*, 2021). Nevertheless, researchers implementing participatory design with children have recognised the potential of enjoyment and playful approaches to unsettle adult-child dynamics that otherwise limit children's influence over designs and the design process (Schepers, Dreessen and Zaman, 2018b; Schepers *et al.*, 2019). As a result, participatory design has recognised the importance of fun and enjoyment as a key outcome or impact for the children involved (Schepers, Dreessen and Zaman, 2018a, 2018b; Safari, Wass and Thygesen, 2023). Though others have recognised that children and young people often experience participatory research methods as fun and enjoyable (Gallacher and Gallagher, 2008; Holland *et al.*, 2010; Lundy, McEvoy and Byrne, 2011), it is only more recently

that researchers have started to conceptualise fun as a key factor affecting children's participation in research (Horton *et al.*, 2012; Wright, Tisdall and Moore, 2021; Lee *et al.*, 2022).

Despite this recognition of the potential connection between enjoyment and agency, even research which builds directly from playful approaches within participatory design has tended to focus on more adult-centric notions of power (Schepers *et al.*, 2019). Similarly, rights-based research which recognises the potentially negative impact of conceptualising children as incapable and unreliable (Christensen and Prout, 2002; Kellett, 2009; Tisdall and Punch, 2012), and anticipating criticisms of trivial and childish findings (O'Kane, 2008), has also prioritised *serious* research outputs:

> Although the work that is carried out with the children can and indeed should be fun and engaging, the findings and outputs must be serious.
> **(Lundy, McEvoy and Byrne, 2011, p. 733)**

Given the emphasis and significance of fun and enjoyment to student co-creators' experiences of the two studies presented here, and the parallels I have drawn with computational empowerment, I call for more attention on fun as a mechanism shaping the experiences of autistic children and young people engaged in co-production. By reorienting research to explore playfulness within autistic children and young people's experiences of co-production, such research might reduce the prevalence of pathologising narratives which position autistic children's play as deficient (Howard and Eisele, 2012; Cardinal, 2021), or as something to be co-opted for the purposes of addressing perceived deficits (Spiel and Gerling, 2021).

Through the adoption of playfulness as a lens for co-production, researchers and educators would be encouraged to engage in moments of building knowledge-through-connection (De Jaegher, 2021) which explore the authentic participation of autistic children and young people in co-production, while *letting children be* without intending them to change (De Jaegher, 2020, 2021). Rather, engagement with and exploration of playfulness within co-production would build upon more holistic accounts of autistic play (Mitchell and Lashewicz, 2018; Briggs, 2019), which are not centred around deficiency or impairment based on neuro-normative expectations. Consequently, I call for further research into the playful aspects of co-production for autistic children and young people, with a view to addressing and replacing deficit-focused discourses about autistic play.

18 Reflexive discussion

This section will explore and reflect on some of the key issues relating to my research. I start by considering the implications of COVID-19 on the shape and direction of my research, before

then discussing experiences of precarity and trust within research-practice partnerships. I reflect on the ethical tensions that arise when adopting participatory approaches, deliberating the difference between ethical regulations, procedures, and practices. Finally, I provide some suggestions for future research directions.

18.1 Implications of COVID-19

> Unpredictability of what is coming next has been difficult
>
> **—Frank (Teacher)**

Inevitably, COVID-19 and the resulting restrictions and guidelines had a considerable influence on my Doctoral research. In March 2020, I had just managed to complete the procedural ethics for the study that would become Part Two, following an in-person information session with parents, and a similar session with students the subsequent week. I had originally planned to conduct the study during an after-school coding club that was set up at the beginning of the 2019-2020 academic year, which I had volunteered to lead. Fairmead School was not closed entirely during any of the lockdowns as they were required to stay open for vulnerable students and those whose parents were critical workers (Department for Education, 2021a). However, announced closures put an end to all after-school clubs that might increase the risk of infection. Upon speaking with school staff, they were enthusiastic to continue with the project, as they felt it would be a valuable experience for students. Consequently, we replanned the study to be conducted through a new coding enrichment session, which would sit as an option alongside drama, cookery and art during a timetabled lesson dedicated to extra-curricular activities.

In September 2020, Fairmead School reopened fully to students (Department for Education, 2021a), and I was able to return to Fairmead in person to volunteer and build relationships with students before completing the procedural ethics process to gain informed consent from the parents and students who wanted to take part. In January 2021, a new nationwide lockdown and further restrictions in schools meant that groups would no longer be allowed to mix. This consequence of the pandemic created ethical challenges both in terms of who was excluded and included from the first study. Many of the existing student co-creators were part of the facilitating teacher's tutor group, but some were not. While there was some discussion about including students from other tutor groups in online sessions, Fairmead School felt it would be too difficult to try to support a classroom of students doing multiple separate online sessions at once. Therefore, the student co-creators from other tutor groups were temporarily excluded from taking part in the Spring term 2021.

Similarly, the recruitment of new students from within the facilitating teacher's tutor group was also problematic. Unlike the original group of student co-creators, these students had not specifically chosen to take part in the coding enrichment activity. I had met all the new students multiple times at school, as they returned to their tutor group after their own enrichment sessions before leaving at the end of the day, but I did not know them very well. Given that initial relationship building time was intended in part to facilitate the process of giving (or refusing) consent to participate (Holland *et al.*, 2010), the lack of time to build a relationship with these new students added to the issue. However, as the teaching time for students had been significantly reduced in the move to online teaching, the online coding sessions held in January-March 2021 were initially introduced as optional for the other students in the facilitating teacher's tutor group. By the end of the period of online learning, all students from the facilitating teacher's tutor group had joined online sessions and completed the procedural ethics needed to show their consent to participate. To account for the more diverse interests of the group, I tried to ensure that alternative activities were always available when other student co-creators were doing coding-based tasks. For example, one student designed an opening screen for the game while others worked on developing the menu from which characters are chosen. When internal restrictions were lifted in May 2021, the additional students who had been recruited from the facilitating teacher's tutor group returned to their original enrichment options, and the students from other groups returned to coding enrichment and re-joined the study.

In summer term of 2021, several infections within Fairmead meant they once again had to restrict mixing between groups indoors. However, these restrictions coincided with an extended period of good weather, so we were able to conduct the last few coding enrichment sessions of the year outside in the sensory garden, which featured in the digital story about playgrounds and lunchtime described in 13.3. The new environment for the sessions brought challenges, as it disrupted our existing routines and practices. For students who were otherwise in different classes, these sessions allowed them to spend (socially distanced) time with friends, but this meant some students were often more focused on each other than editing their digital stories. Additionally, we all had to negotiate the considerable heat and the bright sunlight by making use of shaded spots between buildings and under the friendship hut.

As described in Part One, the ongoing influence of COVID-19 and related restrictions were key parts of the context and rationale for the second study, described in Part Three. Consequently, there were fewer unanticipated issues as the impact and nature of restrictions were accounted for and planned into the study design. In terms of the changes to classroom practice, the main impact of shifting COVID-19 restrictions was inconsistency regarding which staff were supporting the study, as the imposition of a "bubble" system which restricted movement

between classes meant the teacher who had started the project with me was only able to join us for short periods of time.

However, the responsive nature of the study, which addressed the impending need to support the transition into the new school building when access to the building was limited, meant that time was a limiting factor on what could be achieved. For example, I did not request access to the EHCPs of students who contributed to the second study or collect data relating to their diagnoses or ethnicity due to the extended ethics review this would have entailed. By collecting diagnostic and ethnicity data, which is regarded as sensitive according to the Data Protection Act (UK Government, 2018), my ethics application would have needed approval from supervisors, faculty ethics committee and the research integrity and governance committee (Research Integrity and Governance Team, 2021), each of which could potentially delay the start of the study. Consequently, I was not able to report the ethnicity of the students involved in the second study. I recognise that this potentially contributes to epistemic injustices which result from a lack of representation of people with intersectional identities who are often considered difficult to engage in research (Catala, Faucher and Poirier, 2021). Within autism research, people from minoritised ethnic groups, girls, non-speaking autistic people, and people with profound and multiple learning difficulties are more often excluded from research (Pierce *et al.*, 2014; West *et al.*, 2016; McCoy *et al.*, 2020; Cascio, Weiss and Racine, 2021). Not including ethnicity data for participants is, therefore, a limitation of my research since it constrains a wider understanding of who is being included and excluded from research (Broder-Fingert *et al.*, 2019).

18.2 Working through precarity and trust in research relationships

As I explained in Part One, my Doctoral research was conducted within a research-practice partnership using a participatory action research approach which aimed to address the exclusion and marginalisation of autistic young people in educational research. Given the recognised link between quality and research relationships in this type of research (Howard and Thomas-Hughes, 2021), in this section I reflect on experiences of building and maintaining the research relationship within the context of my Doctoral research, drawing on my own perspectives, and those of some of the teachers who contributed in various ways.

While the importance of building relationships with students was clear from the outset, it was the relationships I developed with the wider school community which were essential within the context of undertaking research during the COVID-19 pandemic. Although the benefits of partnerships between research and practice are generally well-recognised (Parsons and Kovshoff, 2019; SCIE, 2022), the sustainability of such relationships are dependent on the

commitment of schools to contribute their time and resources on top of their existing workloads (Parsons *et al.*, 2013). Consequently, early recognition of the potential benefits to our collective effort from Fairmead School was hugely important to the success of my research:

> When we first set out on it, it sounded like a great opportunity to do a project with an external partner. It felt like it was going to be beneficial for both yourself, and us as an organisation.
>
> **—Frank (Teacher)**

Nevertheless, when the UK government announced initial school restrictions in March 2020, I anticipated it may be the end of my involvement with Fairmead, as schools faced unprecedented demands to support families and provide online learning for students unable to attend in person (Crane *et al.*, 2021). At that point I had spent six months volunteering at Fairmead School, building relationships with the students and staff, and working with them to create plans for my first study. Faced with the risk of losing the research relationship which I had invested considerable time and effort in, the position of my research felt extremely precarious, especially given my reliance on Fairmead School as an essential collaborating partner. However, the time I had afforded for building relationships with the school and the students proved to be vital for being able complete my research at all. The recognition of and trust in the mutual benefit which the school and I were gaining through our continued engagement meant that senior leaders continued to support my research within the context of school-closures and ever-changing COVID-19 restrictions:

> We recognised that while it was useful to her university work, it was also hugely beneficial to us.
>
> **(Crump, 2022)**

Furthermore, while having Fairmead School as my only research partner increased the potential impact of them withdrawing from my research, it ultimately facilitated my return to in-person data collection. Although visitors to the school were otherwise restricted, they were able to treat me as a member of their community on the basis that I was not conducting research with other schools and was otherwise working from home and following government guidance.

As such, the continuation of my research with Fairmead represented considerable trust on both parts. From my side, I needed to overcome the discomfort of my reliance on Fairmead School and trust their commitment to my research. Similarly, Fairmead needed to trust that I would act according to government guidance and in the best interests of their students and staff, for whom they had a duty of care. Despite Fairmead's ongoing commitment to my research, the continual lifting and imposing of restrictions prolonged my sense of vulnerability. With each

announcement of restrictions, I wondered whether it would even be possible to finish the first study, let alone achieve enough to constitute a full thesis. My discomfort with the enduring uncertainty was exacerbated by my adoption of and commitment to a participatory approach, meaning I was unable to make decisions, plan or prepare for future stages of research when I otherwise would have liked to. In retrospect, I recognise that growing to accept this discomfort, and letting go of the control which I imagined I might have had over my research was a necessary stage in the development of my skills as a facilitator of co-production (Barke, Thomas-Hughes and Howard, 2020).

Ultimately, in working through the precarity of COVID-19, and building trust in our commitment to the research-practice partnership, the community of Fairmead School and I have achieved benefits which extend far beyond the original aims and objectives of each project:

> We've learnt more from it as an educational organisation, than we thought we would. We thought that the young people would learn about coding and we'd benefit from that, and you'd benefit from being able to work with our young people. As it is, I think there has been a bit about how we work projects with young people that has been really interesting.
>
> **—Frank (Teacher)**

Despite the difficulty of these experiences, we have both experienced the value and benefits of research-practice partnerships. Though the studies are now complete, the research relationship will continue through dissemination activities, which aim to share our findings and increase the reach of their impact. I explore the wider impacts of the research more fully in section 20 below.

18.3 Messiness and flexibility in participatory action research: tensions between ethical regulations, procedures and practices

Ethics refers to the values and moral principles which guide conduct in research (Morrow and Richards, 1996). Ethics is an important consideration within any research project, but especially those which engage with people who are considered vulnerable, such as disabled people (Morgan, Cuskelly and Moni, 2014) or children (Christensen and Prout, 2002; Holland *et al.*, 2010). The role of research ethics committees is to ensure that researchers follow procedures in line with institutional and national regulations. Within this role, there are the underlying assumptions that researchers are powerful, participants are vulnerable, and ethics committees and regulations exist to protect participants from harm (Juritzen, Grimen and Heggen, 2011). As such, ethical regulations and procedures are primarily concerned wit(Beebeejaun *et al.*,

2015)kind) (Beebeejaun *et al.*, 2015), informed consent (Parsons, Abbott, *et al.*, 2015), anonymity (Grinyer, 2002; Carusi, 2008) and confidentiality (Carusi and de Grandis, 2012). Within this section, I reflect on the tensions which arose as a result of the conflict between my own values (as set out in 5 and above in section 17.1), and the values espoused within the ethical regulations and procedures required of me by the University's ethics committee.

Within the context of participatory action research, trusting relationships between researchers and the communities they are researching with are regarded to be a core tenet of good ethical practice (Edwards, 2002; Centre for Social Justice and Community Action, 2012; Gubrium, Hill and Flicker, 2014). As such, the timing and nature of informed consent procedures present an issue to researchers, who often wish to build relationships with participants before engaging in the formal ethics procedures required to show informed consent. Previous participatory research has found that ensuring strong relationships between researchers and participants can give potential participants the confidence to more openly express their desires and concerns about research, allowing them to engage more actively in the ongoing process of consent (Holland *et al.*, 2010). Within my research, the extended period of relationship building enabled students to express concerns and ask questions during the formal consent process, which they may not have been confident enough to do if I had not already invested significant time getting to know them. For example, students expressed concerns about meeting industry guests within the first study, and whether participating required them to appear in front of the camera in the second study.

As I wanted to build relationships with students before seeking informed consent for them to participate in my research, it was important to be transparent about the purpose of my presence in the classroom (Morgan, Cuskelly and Moni, 2014). I was introduced as a researcher, and not a teacher, to ensure clarity about why I was there. In doing so, I tried to embody the principles of ethics in action which go beyond the anticipatory ethics regulations and procedures required by the university (Frauenberger, Rauhala and Fitzpatrick, 2017). I also followed advice from other participatory design researchers regarding trying not to resemble authority figures when interacting with students (Nesset and Large, 2004). Specifically, I tried to emphasise this different relationship by asking students to use my first name, rather than surname, and dressing more casually than would normally be expected of school staff.

With respect to the procedure of gaining informed consent from participants, the notion of informed consent relies on being able to communicate precise plans for what participating will involve, leaving little room for the openness and flexibility which both participatory and action research require to adequately facilitate participants' influence over research (Hayes, 2011; Fox, 2013). Lengthy and cumbersome university ethics processes and procedures can be

restrictive within emergent, participatory research designs and limit the extent to which co-researchers (who are formally treated as participants by university ethics' boards) are able to contribute to decision making (Morgan, Cuskelly and Moni, 2014). Additionally, in taking the position that children and young people should have more influence over research, we create uncertainty about precisely what the research will entail. This uncertainty is generally unwelcomed within university ethics procedures, which aim to prevent harm from the all-powerful researcher to the powerless participants (Juritzen, Grimen and Heggen, 2011). Researchers are often forced to choose between creating vague ethics documents which undermine the idea of informed consent or starting to build relationships and plans with potential participants before submitting their request for formal ethics approval. In doing so, researchers are seemingly trapped between university ethics regulations and engaging in ethical research practices which adhere to their own values. Within my own work, I have tried to tread the line between these two options by building in a degree of flexibility to procedural ethics documents and submitting amendments to initial applications to account for student co-creators' role in planning.

Even with the support and facilitation of school staff, the formal ethics procedures required by university regulations and committees were logistically challenging, with teachers investing a lot of time and effort in talking to parents and chasing missing consent forms. Additionally, despite trying to use simple language, the written documents and evidence which appear to be preferred by university ethics committees created barriers to some parents' understanding. For parents with lower literacy skills, a reliance on written letters as the primary form of communication about studies was problematic. Therefore, additional phone calls and conversations with parents were required to ensure they were able to understand and meaningfully agree to their children taking part. Furthermore, my emergent approach to the research required updates and amendments to be submitted for ethics review. This resulted in multiple rounds of information sheets and consent forms, which increased potential frustration and confusion for both families and school staff.

These issues highlight some of the difficulties in conducting collaborative research based within research practice partnerships, as the boundaries between what is recognised as either research or practice can become blurred (Parsons, 2021). Formal ethics procedures require a level of detail far beyond that of normal practice in schools, within my research this led to educational practitioners feeling that they are asking permission for activities which would not require additional scrutiny in other circumstances. However, the involvement of researchers and the intention to share data outside the school community marks a significant difference to normal educational practice, which rightly needs to be communicated clearly to relevant stakeholders (Parsons *et al.*, 2023). As I have already described, the communication of

information between researchers, schools, students and their families required commitment and collaboration from school staff, which is only possible in the context of committed and trusting research relationships (Parsons *et al.*, 2023). This issue is made only more complex by the inherent *messiness* associated within creative and participatory research designs, where the nature of co-produced outputs cannot be meaningfully defined in advance (Thomas-Hughes, 2018b), and attribution of authorship and ownership is not clear-cut (Björnsdóttir and Svensdóttir, 2008; Morgan, Cuskelly and Moni, 2014).

Consequently, I have followed Parsons *et al.* (2023) in attempting to address the ethical tension between the standard anticipatory university ethics procedures and the participatory approaches employed within this research by handing some degree and responsibility and ownership of the digital stories to Fairmead School and the student co-creators. Within the first study, the digital stories were securely shared with student co-creators' families, and additional permission was sought to include images of the participants depicted within this thesis. Within the second study, Fairmead School retained ownership of the digital stories and are responsible for their sharing within the context of the virtual tour. Although beyond the scope of their normal practice, they checked the permission of all those depicted before sharing them in that way.

Despite the challenges of completing formal ethics procedures, school staff noted the benefits of doing so for both students and their parents. In seeking permission from parents, they were more invested and interested in the research:

> The process engaged parents more. It's important enough that we are being asked to give permission for this, therefore now I am interested.
> **(Crump, 2022)**

For students, starting the project with the formal ethics procedures set a precedent for the agency which I aimed to enshrine in my research practice. Given the limited options for children to practice agency in school (Horgan *et al.*, 2017), this opportunity for students to express and practice agency over whether they chose to take part was an unexpectedly empowering experience for them:

> I think they took great pride in signing their own ethics forms and in being treated as young adults, which is what they are. It almost gives more purpose and reason and value to the project, because they are being asked if they are ok, if they are happy to do this.
> **(Crump, 2022)**

Consequently, questions remain as to how researchers can achieve the benefits of current ethics procedures while avoiding the logistical challenges and allowing the adoption of ethical

practices that enable co-creators to have real influence over the shape and direction of research.

Before COVID-19 forced the adoption of other procedures, I conducted an in-person information session with the parents and guardians of prospective student co-creators. While attendance of such sessions may not be convenient for all parents, I felt this had been a positive experience for those who were able to attend and receive information through a short presentation and Q&A. All the parents who attended chose to sign consent forms in person, thereby reducing the effort required from the school to coordinate sending and receiving forms. Following public health guidance which severely limited the feasibility of in-person information sessions, I provided videos to supplement information sheets for parents, however I follow others in recognising that more could be done to take advantage of digital forms of information sharing and consent (Parsons, Sherwood and Abbott, 2016).

With regards to the clarity and flexibility of ethics documentation, I believe there is scope for innovation relating to the way we ask participants to agree to different activities and forms of data. In particular, the inclusion of images and video footage of people within digital stories poses a serious risk to their anonymity. Some have called for a multi-stage process whereby participants first consent to participate, and then agree for digital stories to be shared and/or included in analysis (Gubrium, Hill and Flicker, 2014; Campbell, 2020; Gubrium *et al.*, 2020). However, I also call for the inclusion of more explicit addressing of the types of data and sharing which each potential participant would be happy with. For example, rather than standard boxes through which participants agree to a fixed procedure, researchers might choose to include a several columns whereby participants can indicate whether they are happy for particular types of data to be collected and shared through various forums. A suggested example of this is shown in Figure 18-1.

For each of the following types of information, please tick the relevant column(s) to indicate whether you are happy for researchers to use that data within their analysis, or share it anonymously, or share it without anonymisation. For visual data, anonymisation involves blurring images so that you are no longer recognisable.

Type of data	**Happy to include in analysis?**	**Happy to share anonymously?**	**Happy to share without anonymisation?**
Physical and digital activity sheets I have completed			
Researcher observations and notes			
Audio recordings from activities and interviews			
Transcripts of audio recordings			
Photographs of me			
Descriptions of photographs			
Videos of me			
Transcriptions of videos			

Figure 18-1: Suggested method for requesting consent for different types of data from potential participants

By adopting this approach, researchers may be able to address potential issues relating to the anonymity and confidentiality of different types of data. For example, within the second study, it would have allowed parents to indicate concerns about images and video of their children being included in digital stories more directly, rather than this needing to be negotiated on a case-by-case basis, as described in 12.3.

18.4 Inclusive dissemination

Ensuring that dissemination of findings is inclusive of those who contributed is a natural extension of participatory action research's commitment to enabling marginalised voices to tell their own stories (Morgan, Cuskelly and Moni, 2014). Additionally, Callus (2019) questioned the extent to which research can be described as inclusive if the findings are not accessible to those involved. Given my adoption of participatory action research as a methodology, and inclusion as a core value within that, I also committed to facilitating opportunities for student co-creators to contribute to dissemination. digital stories played a considerable part in this;

especially in the case of the first study, where they were intended to provide a way for student co-creators to develop their own accounts of creating “Birds with Guns”. However, by committing to inclusive dissemination, I created another conflict between my desire to practice what I considered to be ethical research, and the principles of anonymity and confidentiality that underly ethical procedures as set out by standard regulations.

In both studies, digital stories provided a lasting record of student involvement in a form that is more accessible than my own academic writing. This is important, as Doctoral research, and academic research more widely, often fails to produce impactful reports of research which are accessible to those who have contributed to it (Goodley and Moore, 2000; Björnsdóttir and Svensdóttir, 2008). Consequently, the sharing of digital stories was an important element in my attempts to ensure that dissemination of findings was accessible to the student co-creators who worked with me. In the case of the first study, I tried to share digital stories with the parents of students who contributed to them, so that each student co-creator had access to a copy of the digital story which they consider to be theirs. As I have already described, the digital stories created for the second study have been made available to students through Fairmead’s YouTube channel and the virtual tour. In each case, the sharing of the digital stories was made clear during the informed consent procedures, and in the case of the second study, Fairmead School staff received additional confirmation from parents that these videos would be shared online before they were posted.

Nevertheless, within this commitment to inclusive dissemination, I recognise the tensions which exist between ensuring accessibility of findings and the formal demands of a PhD. For example, the complex language and technical terminology required to critically reflect on my research and how it related to wider literature means that this thesis, and the publications which I hope will follow, are not accessible to many of the student co-creators who I worked with. However, I recognise the role which academic publications can play in recognising the contributions of educational practitioners and have already co-authored an account of the first study with Ben Crump, who was a key facilitator of my research at and with Fairmead School. Concurrently, the formats for reporting which may be best suited to dissemination of findings to student co-creators, like the videos and cartoon strips I employed within the first study, are often not valued and respected within the academy (Walmsley, 2004; Björnsdóttir and Svensdóttir, 2008). Additionally, others have warned of the hostility and confusion which co-researchers can experience when contributing directly to academic presentations (Morgan, Cuskelly and Moni, 2014).

Consequently, I have endeavoured to provide opportunities for student co-creators to be recognised for their contributions to my research in other settings, where they can participate in

communicating research findings in positive and inclusive environments. In particular, Fairmead School and I held a hybrid event which presented our joint research during the ESRC Festival of Social Science in 2021 (a summary of the event as well as the recording of the webinar is available on the ACoRNS website). The event consisted of a webinar, followed by an in-person showcase of research, which was open to KS4 students and staff during the school day, and external stakeholders such as governors, parents and educational psychologists in the afternoon. Some student co-creators contributed by creating additional videos about each of the studies which were shown as part of the webinar, and others supported by helping in each of the rooms showcasing the digital stories, virtual tour and "Birds with Guns". In this way, students were able to experience the influence of their work to their peers, teachers and parents, in an environment which I knew would be supportive and respectful. Further details and links relating to this event can be found in A.2.

19 Impact

The main purpose of my research was to explore the process of co-creating digital stories as a form of co-production, and the opportunities that it may provide for autistic students in terms of their education, and involvement in educational research. Critical reflection on the outcomes of co-production has been suggested as a key element in assessing the quality of co-production (Howard and Thomas-Hughes, 2021), especially given the propensity for serendipity (Barke, Thomas-Hughes and Howard, 2020) and unexpected outcomes (Pain *et al.*, 2015) within co-production. As I have already discussed the specific outcomes for each project earlier in sections 15 and 16, this section will critically reflect on the wider impact of my research, first by considering its impact on the students and adults involved, the wider school, and finally the impact that conducting the research has made on me. In doing so, I hope to critically appraise and evidence the impact of my research, rather than adopting the purely celebratory tone which has been criticised by others (Nind, 2014a; Howard and Thomas-Hughes, 2021).

19.1 Students

In Part Two and Part Three I explored student co-creators experiences of engaging in research, however the impact of this stretched beyond the findings reported in those sections. In line with the approach that I have taken elsewhere, and in recognition of the heterogeneity of the student co-creators, I will now present a few examples of the wider impact of these experiences. These examples are not exhaustive or representative, instead they serve to demonstrate some of ways that engaging with co-produced researched can impact the wider educational experiences of young people. As in the rest of the thesis, the students' names are pseudonyms.

19.1.1 Ken

Ken was involved in the first study, he joined the coding enrichment group a couple of weeks into the 2020 autumn term, having just joined Fairmead School and been out of school for over six months. Ken was often direct and critical with feedback to me about how I had planned activities, or the resources I had found to include in the game. Although he would never have admitted it, he was highly motivated by the freedom and creativity which the project afforded him. As a new student, it also gave him the opportunity to meet other students with similar interests in games and gaming, some of whom quickly became his friends. This motivation and the social connections he built was noted by teachers, who credited them as factors in his reliable attendance to coding club sessions, despite inconsistency across the rest of the week:

> Even in returning his attendance had been quite up and down, a bit hit and miss, but what we found is that he was turning up to every session of that, because he was really engaged and because he felt he had some ownership of it. And he's someone who likes to explore his own creative ideas, and with him being on the GCSE pathway, there are a lot of times when he feels he's not been able to go his own way, because he's being restricted by the syllabus that has to be covered. So I think that really helped him, and it helped him to build friendships which was really important.
>
> **—Frank (Teacher)**

19.1.2 Connor

Connor was also involved in the first study, though as I describe in 9.3, he often preferred to practice his agency by choosing not to engage in the activities I had planned, which on occasion caused tensions with teaching staff. Despite this, on several occasions he engaged very deeply in coding and was the first to whizz through the programming tasks I had planned. When coding sessions were moved online, teaching staff regularly commented that Connor struggled with the increase in screen time, and he consistently selected paper-based versions of activities rather than digital ones. However, the move to online sessions also meant that Connor could communicate via the chat. As a very proficient typist, I found that the chat opened up what Connor was willing to share and contribute, where he previously would have just refused. This was reinforced by feedback from the lead teacher:

> His ability to communicate increased massively when he started talking on the chat, rather than actually speaking, and suddenly he was able to access things to a much greater extent and be much more a part of the project which was actually going on.
> **(Crump, 2022)**

As we returned to in-person sessions, Connor was no longer able to access the chat regularly during our time together, and the wider impact on his education is less clear. His experiences were shaped by moments of connection and disconnection. While the chat, interactions with his peers, and occasional moments of intense focus connected him deeply with our work, he also showed long periods of disconnection, during which he chose other activities entirely. Consequently, the impact on his wider education is less clear.

19.1.3 Jason

Jason was involved in the second study, and contributed to the creation of the digital story about teachers and the immersive videos in the existing school building. Compared to other students, he often received more adult support in class to direct his attention towards activities set by teachers, and regulate his emotions. For Jason, the space created through co-production allowed him to better self-regulate and manage his attention and focus. While engaged in the study he was more able to maintain his focus without adult intervention, requiring less frequent and shorter breaks during lessons, as noted by the lead teacher:

> I can think of a young man, who really struggles to engage, who basically works for 10 minutes on, 10 minutes off timetable during a lesson. And if I say that that young man, when engaged with filming, was able to be on work for 20-25 minutes, and off work for 5, because he wanted to be involved and not leave it. That perhaps is a reflection of the impact of that autonomy of decision making.
> **(Crump, 2021)**

Jason is friendly and playful but finds speech challenging and often stutters. He is someone who often feels that he needs to express himself physically, using his whole body to show excitement by jumping, or by ripping up bits of paper when he is bored or frustrated. He loves books, soap operas and drama, but initially the idea of featuring on video was scary for him:

> In spite of his difficulty in spoken communication, he was then willing to go on the camera, and speak, and allow us to put that onto the website, which was just an

> amazing thing for him, and really touched his family who didn't expect to see him doing something like that.
>
> **(Crump, 2022)**

Through taking part in the study, Jason showed he could self-regulate, collaborate and that he had the confidence to speak on camera. Consequently, for Jason, the biggest impact of his involvement was a change of expectations from others about what he could achieve when he is able to truly participate in his education.

19.2 Individual teaching staff and technology professionals

Though adults were not the focus of my research, the interviews with school staff and technology professionals conducted for the first study provided insights about the impact which that study had on them and their professional practice. As discussed in 9, the adults involved, like the student co-creators, developed technical knowledge and skills, as well as finding the project enjoyable and meaningful:

> I feel very honoured to take part and I very much enjoyed it, and of course, who wouldn't enjoy birds with guns. It's genius.
>
> **—Drew (industry guest)**

Furthermore, having a researcher in the classroom brought a different dynamic to lessons, giving teachers the opportunity to reflect and do things differently:

> It's been fun to step back and have that slightly different role in the classroom and look at young people learning.
>
> **–Frank (Teacher)**

> What I hadn't realised until we did this project was how much I focus on the outcome that I need young people to achieve, and how tightly I direct them towards that outcome.
>
> **(Crump, 2022)**

In particular, the first study allowed teachers as well as students to think about how they delivered career guidance and education about employment, emphasising the need for interrogating the realities of students' goals and aspirations:

> I think, when students talk about things they want to do when they're older, I think it's made me realise that actually I think I need to kind of help them break it down. So when they start talking about jobs they want to do, I think it's important they actually

> understand the elements of that. And um, the whole task enabled what, what is needed to build a game, and all the sort of job roles that come into it.
>
> **—Scarlet (Teacher)**

In doing so, educational practitioners hoped to provide better career advice and guidance, helping students to find information about roles in aspirational industries that matched their individual skills and strengths:

> Students at Fairmead in particular, but also students with SEN, they probably often get told, oh you can't do that because... and actually they probably could, there will be other job roles that they could do within that particular sector, and I think it's important that that's investigated and looked at more.
>
> **—Scarlet (Teacher)**

Overall, school staff found theirs' and the students' involvement to be an overwhelmingly positive experience, meaning staff were enthusiastic to engage in similar research-practice partnerships which can strengthen their educational practice and expertise:

> There is a keenness to look for other partnerships.
>
> **–Frank (Teacher)**

19.3 Whole school provision and direction

As well as the impact on the individual members of staff involved, the research also started to create change within the wider school. As a result of the first study, coding is now offered to students through their extra-curricular enrichment sessions, due to the increased confidence and skills of school staff:

> Coding is now on our curriculum, and it couldn't be before, because we didn't have the skills and the know-how. And that's not to say that members of staff have acquired the same skills as you, but they do have enough to support to have it on the curriculum for our young people.
>
> **—Frank (Teacher)**

Despite recognising the difficulties associated with the types of learning experiences which co-production facilitated, teachers have reflected on the opportunities which this approach has provided for students:

> It's not just about coding, it's about the way we learn, and the way we go about a project, the way we collaborate with other people, the way we problem solve to get to where we want to be.
>
> **—Frank (Teacher)**

The ongoing collaboration with teaching staff and senior leaders at Fairmead also led to a strengthening of the values which sit at the heart of my research. Working closely with senior leaders, such as Ben, has started to change the direction of whole school development. Over several public events, Ben described the status of his work as curriculum lead when we first started working together and how the ongoing relationship with me and my research has shaped the priorities and direction of this within the school:

> We were looking to strip back our curriculum and really consider carefully what our priorities for learning are, for all of our learners, for all of our learners with a different profile and for every individual.
>
> **(Crump, 2021)**

> As the curriculum lead influencing other members of staff, it has also made a difference, in encouraging people to bring greater flow and to think really carefully about that journey's end, and how we can bring greater flexibility to how young people make that journey, and to give them more ownership of that. And that's, I think, the biggest broader impact on our school.
>
> **(Crump, 2022)**

Importantly, I think these quotes show a strengthening of his commitment to difference-centred and strength-based approaches, as he attempted to create more opportunities for the kinds of playful learning experiences which student co-creators had during the co-production of our research. Consequently, the integration of co-production and more playful learning experiences across the whole curriculum could be seen as an idealistic future for children and young people, where students are able to practice agency and collaboration in their learning, meaning their learning is more joyful and they are more motivated and able to self-regulate. Under the current OFSTED framework, schools are afforded some flexibility in their curriculum providing they can evidence the benefits (Office for Standards in Education, 2019). Consequently, progress towards this future will necessarily be slow, while Fairmead School gather evidence to justify expanding this approach across the curriculum. Consequently, future work might also explore how opportunities for co-production might be offered within core subjects such as English and Maths (UK Government, 2022d).

19.4 Me

Given that I have already set out the importance of reflexivity within co-produced and participatory research in 5.2, it is important that I also consider the impact of these studies on me as the researcher. As I mentioned in section 1, PhDs are the means through which researchers train and learn how to do academic research by engaging in it. The prominence of the journey metaphor in reference to PhDs reflects how transformative they can be in terms of the development of the self (Miller and Brimicombe, 2004; Amran and Ibrahim, 2012; Mantai and Dowling, 2015; Stanley, 2015). For me, the PhD process has been instrumental in bringing together my academic interests, values, and skills through the embodied experiences of practising school-based research. Where at times I have felt a dissociation between my engagement with the academy and the embodied experiences of co-producing research at Fairmead School, through the process of analysis and writing I have been able to bring those strands together through what I can now identify as a praxeological world view (Pascal and Bertram, 2012; Parsons, Kovshoff and Ivil, 2020). This praxeological approach requires collaborative reflection and purposeful action which aims to transform education by engaging in critical reflection on the power and ethics of these shared activities (Pascal and Bertram, 2012). In doing so, a praxeological approach integrates and values the views of children, their families and practitioners in order to create more equity within educational experiences (Pascal and Bertram, 2012; Parsons, Kovshoff and Ivil, 2022).

As a praxeological education researcher I was able to work with students and staff at Fairmead School to create novel opportunities for more joyful learning through co-production. Through the examination of the wider impacts of my research, I can now also recognise that this approach has helped school leaders to reflect on the *how* and *why* of their own educational practice, which is a core tenet of praxeological enquiry (Pascal and Bertram, 2012). In turn, I have found my PhD to be a transformative experience through which I have grown to recognise my personal need for authenticity and integrity in research, and developed the skills needed to practice and live by my values. The following section explores how future work might build on my PhD research, briefly describing some of the questions and issues raised by each of the studies individually and the wider findings discussed in this Part.

20 Possible directions for future research

The first study responded to calls from Parsons and Cobb (2014) for researchers to consider the process of participatory design, as well as it's outcomes. The findings highlighted the potential value of participatory design as a learning experience for autistic children and young people, when the focus is placed on the process, rather the outcomes, of design. While this finding is

important, it sits in opposition to much participatory design research, which remains focused on assessing the quality and utility of design solutions (Ward *et al.*, 2022). The further investigation of autistic children and young people's experiences of participatory design is consequently an important avenue of research. Following the research presented within this thesis, future research which explores autistic children and young people's experiences of participatory design should be centred around their perspectives and different ways of knowing. It should avoid the privileging of adult concerns and objectives by employing participatory and creative methods, such as digital stories, to explore young people's experiences. With greater understanding of autistic children and young people's experiences of participatory design, researchers should be able to further interrogate the tensions between the participatory intentions for the process and outcomes of design, and provide autistic children and young people with more equitable and enjoyable experiences.

The second study explored the process of co-creating digital stories and 360° immersive videos to support students' transition to a new school building. The findings indicated that this was a meaningful learning experience for student co-creators, who engaged in ways which exceeded staff expectations of how they might choose to contribute. As the practice of using digital stories to facilitate autistic children and young people's transitions grows (Parsons *et al.*, 2023), there may also be further opportunities to compare the opportunities and challenges of co-creating them *with* autistic children and young people, rather than *for* them. For example, research might consider how or whether the process of co-creating digital stories might impact experiences of transition by encouraging students to reflect on, and prepare for their own transitions into new settings. Alternatively, research might compare and contrast the content and efficacy of digital stories to support transitions, based on the extent or manner of children and young people's involvement in co-creation.

Together, the studies have highlighted the value of meaningful co-production projects in schools, which can provide joyful opportunities for autistic children and young people to practice agency, collaborate, and learn together. I have connected these experiences to computational empowerment, and considered the extent to which the co-production detailed in these studies reflects its vision, approach and impact. Future research might seek to understand in more detail how the co-creation of digital stories might support creation and analysis, which are key mechanisms within computational empowerment (Dindler, Smith and Iversen, 2020), or explore its potential role in facilitating the expansion of computational empowerment within formal educational settings. As a result of the emphasis which student co-creators have placed on enjoyment within their experiences, I call for future research to explore the conceptualisation of intergenerational collaborations as instances of playful learning. Research might consider the potential impact of a playful approach for the education of autistic

children and young people, and whether there is evidence of similar playful practices within other forms of co-production, with different groups of children and young people. This might include aiming to replicate these studies in different settings and with different participant demographics, for example in mainstream settings, with students of different ages, or who have different support needs.

Given the considerable impact which this research has had on individual staff and the direction of Fairmead School as a whole, future work might also consider how schools can integrate more opportunities for co-production within their offerings to students. This line of research might address whether the current culture and context of education, which often emphasises attainment over engagement (Mardell, Solis and Bray, 2019), is actually compatible with the more holistic and agentive learning opportunities which co-production might provide. A final avenue of research might consider how opportunities for co-production can be facilitated without the presence of a researcher in the classroom to disrupt normal relationship dynamics and create the different space needed for co-production.

21 Conclusions

As Figure 21-1 depicts, this thesis has followed a complex trajectory, drawing from multiple disciplines to explore the potential of digital storytelling within educational research and practice. I have argued that the perspectives of autistic children and young people are easily missed when researchers employ methods that are too rigid, or researchers lack sufficient time to nurture the key relationships with autistic children and young people that are needed to develop interactional expertise. This research has followed Parsons, Guldberg, *et al.* (2015) in positioning digital stories as a method for prioritising autistic children and young people's perspectives, adding to wider evidence for the potential of digital stories to promote marginalised voices which are generally missing from dominant discourses (de Jager *et al.*, 2017). Based on its potential as a tool against marginalisation, through the process of agency, collaboration and learning, this research has added to the growing recognition of digital storytelling as a form of co-production (Heron and Steckley, 2020; Harris *et al.*, 2022).

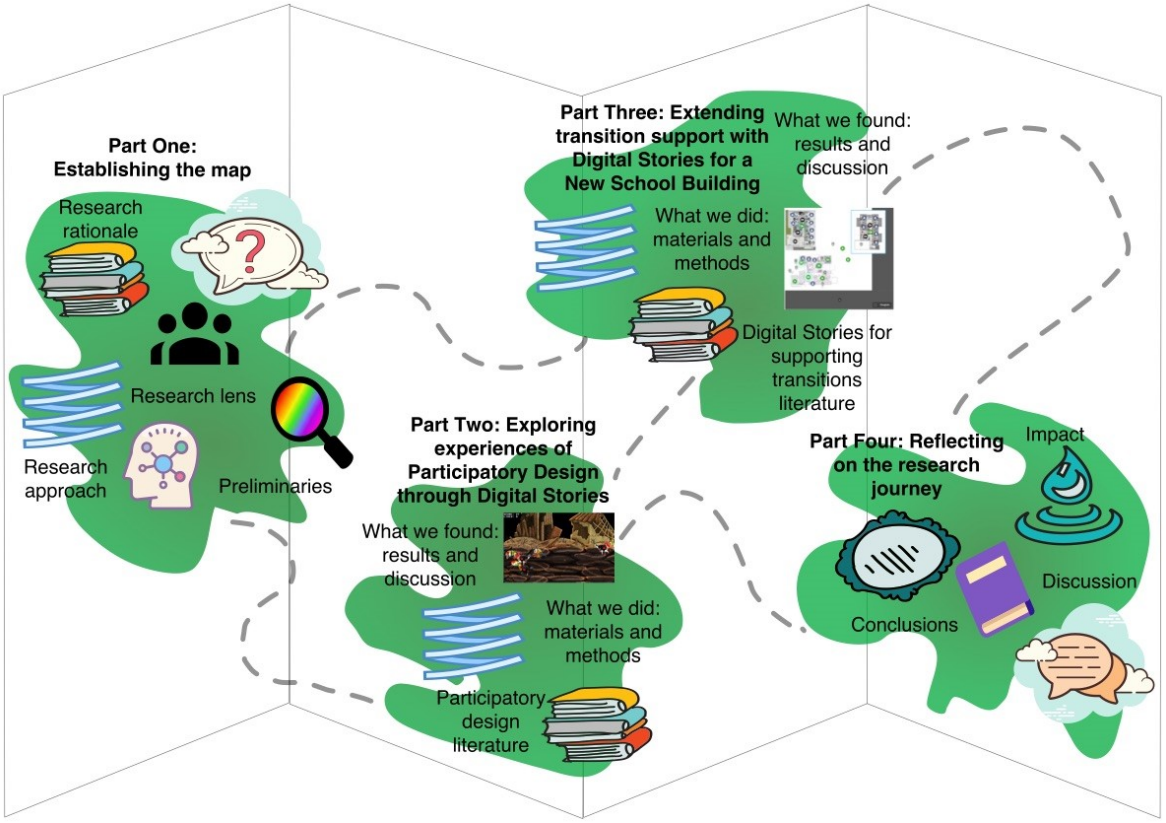


Figure 21-1: Map of the whole thesis

I have conducted two studies involving deep participatory engagement with autistic young people and staff from Fairmead School in Somerset, within the context of a mutually beneficial research-practice partnership. The first study (presented in Part Two) focused on the use of digital stories for exploring the experiences of student co-creators conducting participatory design within a coding club. The findings demonstrated the value of participatory design for student co-creators who came to recognise their collective strengths, through joyful collaboration and learning. In doing so, the study extended the digital storytelling methodology by extending and evidencing its potential application to a new context. The second study (presented in Part Three) followed a sympathetic but different line of enquiry, based on an emerging need to support students at Fairmead School in transitioning to a new school building during ongoing turbulence and uncertainty from changing COVID-19 social distancing restrictions. This study focused on the process of co-creating digital stories and 360° immersive videos about the school, and the opportunities that such co-creation might provide for learning. The analysis again highlighted how co-creating digital stories can be a flexible approach that enabled space for student co-creators to exercise and demonstrate their agency, and allowed students to develop digital skills while engaging in novel learning opportunities and having fun.

Together, these studies have also shown the value of co-creating digital stories as a method for representing the perspectives of autistic children and young people within a school context. They have additionally added to evidence for the benefits of co-creating digital stories as a

means of supporting students to practise agency within their learning. The studies have shown how student co-creators adopted a strength-based approach, allowing them to develop and demonstrate existing skills as well as enabling them to engage with new and novel learning activities which challenged staff expectations about how individual students chose to engage. I have drawn upon students' perspectives to explore the extent to which the studies fit with the current conceptualisations of co-production and emphasised the technological basis of activities to align the studies with the idea of computational empowerment. Finally, I have sought to highlight the potential link between agency and fun, calling for further research exploring the role of playfulness in inter-generational co-production. I have suggested that his potential reimagining of co-production as playful learning could serve as an antidote to the continued prevalence of deficit-focused approaches and narratives within autism research and educational practice.

Future research should seek to explore the conceptualisations of agency, participation, and voice within school-based co-production, as well as seeking to investigate the feasibility and potential of similar projects within other formal educational settings. The research presented here has only been possible within a deeply participatory and collaborative context provided by the research-practice partnership with Fairmead School. However, it is important for the sustainability of more agentive learning experiences, such as those described here, that future research considers how such space can be created and facilitated without the presence of a researcher. While I acknowledge the complexity which results from the many strands of this research and its potential impact, I hope that it might serve as the first step towards transforming educational opportunities for autistic children and young people, so that similarly enriching, affirming and joyful learning experiences are one day considered the norm.

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Appendix A Dissemination of Research

A.1 Co-creation of Research and Design During a Coding Club With Autistic Students Using Multimodal Participatory Methods and Analysis

The methods and analysis of one Jay and Terry's digital story from the first study was published in Frontiers in Education on 13th May 2022 within the Digital Learning Innovations section, it draws on a subsection of the data and analysis included here within Part Two. The paper is open access and available through this link to the Frontiers website. It was submitted on 28th January 2022 under "Championing Inclusion and Diversity: Inclusive Design Practices and Approaches for Education" as a research topic.

The paper has shared authorship between myself (Verity Ward), Sarah Parsons, Hanna Kovshoff and Ben Crump. I conducted the empirical research upon which this paper was based, and wrote the first draft of the paper. I was advised and supported with the research and revisions of the paper by my supervisors, Sarah Parsons and Hanna Kovshoff. Ben Crump is a member of staff at Fairmead School, who helped to plan the research and coordinated with the parents and guardians of the students who participated during the formal ethics procedures.

A.2 ESRC Festival of Social Science 2021

On 5th November 2021, I held a hybrid event to celebrate the contributions of my partners at Fairmead School. I was grateful to receive funding for the event and for it to be promoted as part of the ESRC Festival of Social Science. The all-day event consisted of an online webinar followed by an interactive exhibition of student work for students, their families, staff and the wider school community. Students contributed to the running of the interactive workshop within rooms which showcased "Birds with Guns", the Digital Stories, and the virtual tour, as well as recording some additional videos about their perspectives on the research for the webinar.

A write-up of the event was included on the University of Southampton's website, as well as within the ACoRNS newsletter and on the ACoRNS website.

A.3 Neurodiversity and Games Symposium

With support of the SCDTP training grant, I was able to attend and present the findings from my first study at the Symposium on Neurodiversity and Games at the University of Antwerp on 16th September 2022. The title of my presentation was "Co-creating research and design with neurodivergent young people in a Coding Club". The abstract for my talk can be found in the following subsection.

A.3.1 Abstract

Participatory design has been employed to access and better represent the views of marginalised groups in design solutions. However, the voices of autistic (and other neurodivergent) young people are still regularly excluded from participatory design, due to concerns about whether and how they might engage and contribute to designs. Where neurodivergent young people are included in participatory design, research often remains deficit-focused in its approach. Design outputs are often therapeutic interventions or technologies which aim to address individual impairment. Consequently, little is known about autistic young people's experiences of participatory design. In this paper, I present the findings from a co-produced research project that investigated the experiences of fourteen neurodivergent young people aged 13-16 who designed, developed and evaluated a computer game during an extra-curricular coding club in a special school. This research adopts a strengths-based approach which is shaped by the lens of neurodiversity, and the value of different, neurodivergent ways of knowing.

In the project, students acted as co-creators, who actively engaged in both research and design. As well as designing and developing their game "Birds with Guns", student co-creators produced Digital stories about the project. Digital stories are short videos which show educational experiences from the students' perspectives. Student co-creators also engaged in reflective interviews with each other, and some of the adults who had participated. The analysis drew upon the outputs of design (interim images, audio, composition and the game itself) as well as both Digital story and interview data, through a social semiotic multimodal analysis. This approach actively rejects the primacy of linguistic data that remains common in other academic research, instead recognising the value and validity of the many and varied ways which student co-creators chose to contribute to the project and demonstrate their knowledge.

The findings emphasise the centrality of fun to both the design process, and how this may have been lacking if relying on adult-centred accounts. We reflect upon the importance of opportunities for student co-creators to practice agency over how they contributed to the

project, and the pride they felt in seeing their ideas realised within the game. These opportunities for agency led to unique opportunities for individual student co-creators to recognise their own strengths, and the strengths of others in the group, allowing them to assume the power of their own experience and expertise.

Appendix B Ethics documents for study one

B.1 Information videos for students and parents

Information video for students: https://www.youtube.com/watch?v=v2xTpOSogkk

Information video for parents: https://www.youtube.com/watch?v=8JZRojxeP9o

B.2 Information sheets for students

Student Information Sheet

Researcher: Verity Ward

You are being invited to take part in a research project.

This sheet tells you about it, so you can decide if you want to take part.

You can ask me (Verity) or your teacher if you have any questions.

If you would like to take part, I will ask you to sign a consent form.

What is the research about?

In this project we will design, build, and test computer games. Together we will learn about working in technology companies.

As you know, I am a PhD researcher at the University of Southampton. I will write about this as part of my PhD.

Why have you been asked to take part?

We have got to know each other during the coding enrichment, and I know you enjoy coding. You will learn more about coding, and use these skills as part of the project.

What will happen if you agree to take part?

You will still do coding enrichment. As well as learning more about coding, you will be a co-creator in this project.

As a co-creator, this is your project as well as mine. We will plan together how to test the games, and how to evaluate the project. We will also develop ideas, create story boards, build the games, improve the games, and test them too.

We will have virtual guests come to tell us about their jobs, and they will join in with our activities for the week. We may do other sessions online, if the school has to close because of coronavirus.

We will also work together to document the project. Every week there will be cameras for you to take photographs and videos. We will also record the online sessions with virtual guests. At the end we will create video stories about the project. You will be given a copy of your story to take home with you.

Why might want to take part…

- It should be fun, especially if you already like coding enrichment
- You might learn more about working with technology as a job

Why you might not want to take part…

- There will be new adults who will talk to us on Teams or Google Classroom, but your teacher and I will always be with you

What information will I (Verity) use for my writing?

I will write about the project for my PhD report, and I may also write about it in journals.

I will use the booklets you complete each session, and the videos you create as evidence of the project. I may show your videos when I talk to other people about the project. I will not share the videos without asking you first.

I will not use your real names, the forms with your real names will be kept safe so no one else will know them. I will use fake names to refer to you when I write and tell other people about the project.

Will anyone else know you took part?

People at school will know you have taken part. The virtual guests will also know, but no one will know it was you from my writing.

Do you have to take part?

No, you do not have to take part. If you do want to take part, you will need to sign a form to show you want to. If you don't want to take part, you need to tell us, and we will arrange other activities for you to do during coding enrichment.

What happens if you change your mind?

You can change your mind about taking part at any time. You can tell me, or your teacher if you change your mind about taking part.

If you change your mind, you will do other coding activities during enrichment, and we will make sure you do not appear in anyone else's videos. I will not mention you when I write about the research.

Where can you find out more?

You can talk to me, or your teacher about the study. We can answer any questions you have about taking part.

What happens if there is a problem?

If you are worried about anything related to the project, you should speak to me or your teacher.

Thank you.

Verity Ward

B.3 Consent forms for student

Student Consent Form

Researcher: Verity Ward

Please tick the boxes if you agree with the sentences. If you have any questions, or you do not want to take part please talk to Verity or your teacher.

	Tick here ↓
Verity has told me about the project, and what it involves.	
I have asked any questions I might have about the project.	
I understand what we are going to do in the project, and want to be a co-creator.	
I understand that Verity will use some of the work we do when she writes about the project.	
I understand that Verity will not use my real name when she writes about the project.	
I understand that I do not have to take part.	
I understand that if I do not want to take part any more I can tell Verity or my teacher and I will do other activities during coding enrichment.	
I understand that taking part involves video recording.	

I understand that Verity may show these videos when she tells other people about the project.	
I understand that other students involved in the project will take home their videos, and that I might be in other people's videos.	

Your name……

Your age……

Signature……

Date……

Name of researcher (print name)……

Signature of researcher ……

Date……

B.4 Parent Information Sheets

Project Information for Parents: Widening horizons through participatory design with autistic students

Researcher: Verity Ward

Your child is being invited to take part in a research study.

This document provides information about the project.

You can contact Verity, the researcher, or Mr Crump at Fairmead School if you have any questions.

If you are happy for your son/daughter to take part you will be asked to sign a consent form.

What is the research about?

This is a collaborative project between me, Verity Ward, and Fairmead School. Together we will investigate whether involvement in the computer game design project can change ideas about future career options for autistic young people and young people with other special educational needs.

During coding enrichment we will design, build, and test computer games. By involving people who work in the tech industry, I hope we can all learn what working in the tech might mean for autistic young people.

I am a PhD researcher at the University of Southampton Education School, I work in the ACoRNS research group. This study will form part of my PhD, which is funded by ESRC.

Agreeing to let your child take part in the study does not commit **you** to taking part in any way.

Why has my child been asked to take part?

Over the last few months, I have been working with your child as part of the coding enrichment on a Friday afternoon. We now know each other well, and your child has learned some basic programming. I hope they will be able to use these skills during this project.

If you do not want your child to take part, we will arrange other coding activities to do during the enrichment sessions.

What will happen if I agree to let them take part?

Your child will continue to come to do coding enrichment as they normally do. As well as continuing to develop their coding skills, they will become a co-creator in this project. The entire project should last about 11 school weeks, though it may take a little longer.

As a co-creator, this project will be as much theirs as it is mine. Together we will plan the project evaluation, as well as how to test the games. We will brainstorm ideas, develop story boards, get and give feedback, build the games, and test them too.

Guests from various local technology companies will attend enrichment sessions virtually via Teams or Google Classroom, and will tell us about their jobs. They will take part in the activities planned for that week, including working on shared google docs. Access to these will be removed at the end of the session.

If normal in-person enrichment sessions are not possible, then we will hold sessions online using Teams or Google Classroom.

We will also document the project together. Each week cameras will be made available for the students to take photos and film what's going on. We will also record sessions with virtual guests directly through Teams. At the end of the project, they will put together videos about

their experiences. You will be given a copy of your child's digital story as a permanent record of their involvement in the project via the University's SafeSend service.

Are there any benefits for my child in taking part?

I hope that your child will enjoy the project. I also hope that they will continue to develop their programming skills, and learn more about working in the tech industry.

Are there any risks involved?

All sessions will follow school and government policy regarding COVID-19 risks. The project does not increase their risk beyond normal school activities.

What information will be collected?

I will collect the following information on the consent forms:

- Your child's name and age
- Your name and contact information

This information will be kept confidential. It will not be passed onto other people.

During the project I will also collect the following information for my own analysis:

- the paper booklets the students complete at Coding Club
- the video records created by the students
- any data from our evaluations

I may show the videos at presentations about the project, but I will not share them or make them public without your consent.

As a research group ACoRNS are very aware that research often fails to encompass voices from the full diversity of the population. We are attempting to address that in our research. If you are happy for them to, the school will share your child's EHCP with me, including details about their special educational needs, ethnicity and eligibility for free school meals. This information will be used to describe the participant group as a whole, and will not be used to identify your child directly. This information will help us better understand whose voices we are representing in our research.

Will anyone else know they have taken part?

These are the people who will know your son/daughter has taken part:

- Other students and staff at Fairmead School
- Verity (PhD researcher) at the University of Southampton
- Virtual speakers from local technology companies
- Parents of other students who take part

No-one else will know they have taken part in the project.

Given the contribution of the school to this project, the school itself will be a named contributor to the work.

I may take notes during coding club, in which case I will use your child's first name only. When these notes are typed up, your child's name will

be replaced by a pseudonym, and the physical copies will be destroyed.

The information I collect about them will be kept strictly confidential. Your child's name will never be used in reports on the project; I will always refer to them by their pseudonym.

Managers at the University of Southampton may ask to see the information we collect to make sure the researchers are keeping it safe.

All information will be stored securely on password-protected computers.

Does my child have to take part?

No. This is their decision as well as yours and we don't mind either way. If they decide to take part, and you are happy for them to take part, we will ask you (and them) to sign a consent form. We must receive your consent form by Tuesday 3rd November 2020.

What happens if I change my mind?

You change your mind at any time without giving a reason. Please just let me (Verity), or Mr Crump know.

If you do change your mind we will make sure your child does not feature in other students' final video records of the project. However, once these have been made, it will not be possible to remove them from the videos.

Given how much the children will work together on the project, I will not be able to remove your child's other contributions.

What will happen to the results of the research?

The results of the research will be written up into a report as part of my PhD. The results may also be published in academic journals. Reports and publications will not include information that can directly identify your child without your specific consent.

I am required by ESRC, who have funded my research, to upload anonymised data to a national database. It will only be accessible to researchers from UK higher education institutions and will not be available to the general public. Researchers will be required to gain ethical approval from their own institutions before they use the data.

Where can I get more information?

Please ask Mr Crump if you have any questions about the project: [email redacted]

You can also contact me (Verity) at the University: v.c.s.ward@soton.ac.uk

What happens if there is a problem?

If you have a concerns about the project, please speak to Verity or Mr Crump first.

If you are still unhappy or have a complaint, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Data Protection Privacy Notice

By law, the University of Southampton has to protect and use the information collected in this project in specific ways. This can sound very formal and complicated.

The main thing to know is that we treat any information very carefully. There is detailed information about this that we have to let you know, and this can be found below.

Thank you for taking the time to read this.

Verity Ward

More details about Data Protection and Privacy that we have to tell you

- The University of Southampton carries out research with the greatest care and consideration.
- We have to have a good reason ('lawful basis') for asking for your personal information.
- The good reason is that we are doing research that we think other people might be interested in, and could help them.
- This means that when you agree to take part in a research study, we will only use information (data) about you in the ways that you have been told about in this project information sheet.
- We will not use your information for any other purpose.
- The University's policy about how we use information about you can be found on its website here: https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page and there is more information about keeping your details private here: https://www.mrc.soton.ac.uk/web2/files/2013/04/privacy.pdf.
- Please ask the research team if you have any questions or are unclear what information is being collected about you.
- The University of Southampton is the 'Data Controller' for this study, which means that we are responsible for looking after your information and using it properly.
- The University of Southampton will keep information about you for 10 years after the study has finished. After this, any link between you and your information will be removed.
- If you have any questions about how your information (data) is used you can find more information here: [https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page]
- If you need more help or information, please contact the University's Data Protection Officer by email: data.protection@soton.ac.uk

B.5 Consent forms for parents

PERMISSION FORM

Study title: Widening horizons through participatory design with autistic students

Researcher name: Verity Ward

ERGO number: 54356

Please initial the box(es) if you agree with the statement(s):

	Your initials go here ↓
I have read and understood the information sheet v1.1 10/09/2020 and have had the opportunity to ask questions about the study.	
I agree to let my child take part in this research project and agree for information about them and their contributions to be used in the study.	
I understand that Fairmead School will share details of my child's special educational needs with the researcher.	
I understand their participation is voluntary and I may withdraw them at any time for any reason without their rights being affected.	
I understand that if I withdraw them from the study that it may not be possible to remove their contributions once their personal information is no longer linked to it.	
I understand that they will not be directly identified in any reports of the research.	
I understand that taking part in the study involves video recording. The students will then create videos about the project.	
I understand that these videos may be shown when this projects presented in academic talks, but that it will not be made publicly available without my permission.	

I understand that parents and guardians of other children involved in the project will receive copies of the videos their children create, and that my child may feature in other children's videos.	
I understand that personal information collected about me and my child such as my name or where I live will not be shared beyond the study team.	

Optional - please only <u>initial</u> the box(es) you wish to agree to:

I agree to be contacted about involvement in the evaluation of the project.	
I agree for Fairmead School to share my child's EHCP with the researcher.	
I understand that details from the EHCP will be used to describe the group of students as a whole and that they will not be used to identify my child directly.	

Name of your child (print name)……

Age of your child……

Your name (print name)……

Contact number/email address ……

Signature……

Date……

Name of researcher (print name)……

Signature of researcher ……

Date……

B.6 Information sheets for staff

Project Information for Fairmead School Staff: Widening horizons through participatory design with autistic students

Researcher: Verity Ward

You are being invited to take part in a research study.

This document provides information about the project.

You can contact Verity, the researcher, or Mr Crump if you have any questions.

If you are happy to take part you will be asked to sign a consent form.

What is the research about?

This is a collaborative project between me, Verity Ward, and Fairmead School. Together we will investigate whether involvement in the computer game design project can change ideas about future career options for autistic young people and young people with other special educational needs.

During coding enrichment we will design, build, and test computer games. By involving people who work in the tech industry, I hope we can all learn what working in the tech might mean for autistic young people.

I am a PhD researcher at the University of Southampton Education School, I work in the ACoRNS research group. This study will form part of my PhD, which is funded by ESRC.

You may be invited to give feedback later on in the project. However, agreeing to take part in this part of the research does not commit you to taking part in any other way.

Why have I been asked to take part?

You are a member of staff who regularly supports the students who do coding enrichment on a Friday. This study will take place during these sessions.

While it is primarily intended to be a learning experience for the students, I hope that you will learn some things during this research as well.

What will happen if I agree to take part?

You will still support coding enrichment, as you normally do. During these sessions the students and I will plan together how to test the games, and how to evaluate the project. We will also develop ideas, create story boards, build the games, improve the games, and test them too. The entire project should last about 11 school weeks, though it may take a little longer.

We will have virtual guests who will join us via Teams or Google Classroom. We may do other sessions similarly, if the school has to close because of coronavirus. Online sessions will be recorded, and you may feature in these recordings.

Every week there will be cameras for the students to take photographs and videos. As the students are mostly responsible for filming you may feature in their final videos about the project. At the end we will create video stories about

the project. A copy of each student's story will be shared with their parents via a secure platform.

As a research group ACoRNS are very aware that research often fails to encompass voices from the full diversity of the population. We are attempting to address that in our research. We would also like to invite you to complete an optional questionnaire about yourself so that we can better understand whose voices we are representing in our research. You do not have to do this in order to take part in the rest of the study. Information from this questionnaire will be used to describe the participant group as a whole, and will not be used to identify you directly.

Are there any benefits to taking part?

I hope that you will enjoy supporting the students who take part in the project. I also hope that you might also learn from it.

Are there any risks involved?

All sessions will follow school and government policy regarding COVID-19 risks. The project does not increase my risk beyond normal school activities.

What information will be collected?

I will collect the following information on the consent forms:

- Your name and contact information

This information will be kept confidential. It will not be passed onto other people.

During the project I will also collect the following information for my own analysis:

- the paper booklets the students complete at Coding Club
- the video records created by the students
- any data from evaluations

I may show the videos at presentations about the project, but if you feature in them I will not share them or make them public without your consent.

If you choose to complete the optional survey we will also collect information about:

- Your age
- Your gender
- Your ethnicity
- Any disabilities you experience

Will anyone else know I have taken part?

These are the people who will know you have taken part:

- Other students and staff at Fairmead School
- Verity (PhD researcher) at the University of Southampton
- Virtual speakers from local technology companies
- Parents of students at who take part

No-one else will know you have taken part in the project.

Given the contribution of the school to this project, the school itself will be a named contributor to the work.

I may take notes during coding club, in which case I will use your first name only. When these notes are typed up, your name will be replaced by a pseudonym or job role, and the physical copies will be destroyed.

The information I collect about you will be kept strictly confidential. Your name will never be used in reports on the project; I will always refer to you by your pseudonym or job role (e.g. “teacher” or “TA”).

Managers at the University of Southampton may ask to see the information we collect to make sure the researchers are keeping it safe.

All information will be stored securely on password-protected computers.

Do I have to take part?

No. This is your decision and I don’t mind either way. If you decide to take part, I will ask you to sign a consent form.

What happens if I change my mind?

You change your mind at any time without giving a reason. Please just let me (Verity), or Mr Crump know.

If you do change your mind we will make sure you do not feature in other students’ final video records of the project, and try to arrange that you support another group during these sessions. However, once these have been made, it will not be possible to remove them from the videos.

Given the collaborative nature of the project, I will not be able to remove your other contributions.

What will happen to the results of the research?

The results of the research will be written up into a report as part of my PhD. The results may also be published in academic journals. Reports and publications will not include information that can directly identify you without your specific consent.

I am required by ESRC, who have funded my research, to upload

anonymised data to a national database. It will only be accessible to researchers from UK higher education institutions and will not be available to the general public. Researchers will be required to gain ethical approval from their own institutions before they use the data.

Where can I get more information?

Please ask Mr Crump if you have any questions about the project: [email redacted]

You can also contact me (Verity) at the University: v.c.s.ward@soton.ac.uk

What happens if there is a problem?

If you have a concerns about the project, please speak to Verity or Mr Crump first.

If you are still unhappy or have a complaint, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Data Protection Privacy Notice

By law, the University of Southampton has to protect and use the information collected in this project in specific ways. This can sound very formal and complicated. The main thing to know is that we treat any information very carefully. There is detailed information about this that we have to let you know, and this can be found below.

Thank you for taking the time to read this.

Verity Ward

More details about Data Protection and Privacy that we have to tell you

- The University of Southampton carries out research with the greatest care and consideration.
- We have to have a good reason ('lawful basis') for asking for your personal information.
- The good reason is that we are doing research that we think other people might be interested in, and could help them.
- This means that when you agree to take part in a research study, we will only use information (data) about you in the ways that you have been told about in this project information sheet.
- We will not use your information for any other purpose.
- The University's policy about how we use information about you can be found on its website here: https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page and there is more information about keeping your details private here: https://www.mrc.soton.ac.uk/web2/files/2013/04/privacy.pdf.
- Please ask the research team if you have any questions or are unclear what information is being collected about you.
- The University of Southampton is the 'Data Controller' for this study, which means that we are responsible for looking after your information and using it properly.
- The University of Southampton will keep information about you for 10 years after the study has finished. After this, any link between you and your information will be removed.
- If you have any questions about how your information (data) is used you can find more information here: [https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page]
- If you need more help or information, please contact the University's Data Protection Officer by email: data.protection@soton.ac.uk

B.7 Consent forms for staff

STAFF CONSENT FORM

Study title: Widening horizons through participatory design with autistic students

Researcher name: Verity Ward

ERGO number: 54356

Please initial the box(es) if you agree with the statement(s):

	Your initials go here ↓
I have read and understood the information sheet v1.0 16/09/2020 and have had the opportunity to ask questions about the study.	
I agree to take part in this research project and agree for information about me and my contributions to be used in the study.	
I understand my participation is voluntary and I may withdraw at any time for any reason.	
I understand that if I withdraw from the study that it may not be possible to remove my contributions to collaborative activities.	
I understand that I will not be directly identified in any reports of the research.	
I understand that taking part in the study involves video recording. The students will then create videos about the project which I may feature in.	
I understand that these videos may be shown when this project is presented in academic talks, but that it will not be made publicly available without my permission.	
I understand that parents and guardians of students involved in the project will receive copies of the videos their children create, and that I may feature in these videos.	
I understand that personal information collected about me will not be shared beyond the study team.	

I understand that I may be asked to give feedback at the end of the project, but that taking part now does not commit me to doing so.	

Optional - please only <u>initial</u> the box(es) you wish to agree to:

I agree to take part in the optional questionnaire about myself.	
I understand that completing this questionnaire will involve providing information about my gender, age, ethnicity and disability status.	
I understand that any information I provide as part of the questionnaire will be used to describe the participant group as a whole and will not be used to identify me directly.	

Your name (print name)……

Contact number/email address ……

Signature……

Date……

Name of researcher (print name)……

Signature of researcher ……

Date……

B.8 Information sheets for technology industry guests

Participant Information Sheet

Study Title: Widening horizons through participatory design with autistic students

Researcher: Verity Ward

ERGO number: 54356

You are being invited to take part in the above research study. To help you decide whether you would like to take part or not, it is important that you understand why the research is being done and what it will involve. Please read the information below carefully and ask questions if anything is not clear or you would like more information before you decide to take part in this research. You may like to discuss it with others but it is up to you to decide whether or not you want to take part. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

This collaborative research project will investigate whether designing and building computer games might change ideas about employment and career options for autistic young people, and young people with other special educational needs. The project aims to give the young people involved the opportunity to design, build, and test computer games. By working closely with me, staff from Fairmead School and other people who work in the tech industry, I hope all those involved can better understand what working in the tech industry might mean for autistic young people and their potential employers.

I am a PhD researcher working in the ACoRNS research group within the Education School at the University of Southampton. This study will form part of my PhD. The project is funded by ESRC. Agreeing to take part in the study does not commit **your employer** to participating in any further way.

Why have I been asked to participate?

You have been asked to take part because you work for a local employer within the field of technology. Your employer has identified you as having skills in one of the following areas:

- Using, and building personas for capturing user requirements
- User-centred design
- Building prototypes
- Software development
- User testing

- Video editing and digital storytelling

What will happen to me if I agree to take part?

Before you agree to take part, I will talk to you about what you do as a job, and how your skills might be relevant to the project. You will be given another opportunity to ask any questions you might have. Once we have discussed this, we will arrange for you to virtually attend a coding enrichment session via Microsoft Teams or Google Classroom. Coding enrichment at Fairmead School usually happens on a Friday afternoon.

Before the session, I will send you the consent form. If you are happy to participate, you will need to complete this form electronically and return it to me via email or the University of Southampton's SafeSend service. You are advised that the SafeSend service is fully encrypted, and therefore presents the more secure option for returning electronic documents. Once you have returned your consent form I will also confirm joining instructions for the online session.

At the beginning of the session I will explain who you are, and you will then briefly talk to the children about what you do for a job, and how this relates to the activities for that week. Once you have told us about yourself, the students will have an opportunity to ask you questions. Then we will move on to the activities planned for that week. This may involve accessing and contributing to shared google docs. Access to these shared files will be removed at the end of the session. We will encourage you to work with the students on the week's activities, and get to know them a bit as they carry out the tasks for that week.

As part of the project, the students will be working together to create documentary-style videos about their involvement in it. Each week cameras will be made available for the students to take photos and film the activities going on. Additionally online Teams meetings will be recorded. At the end of the project, they will put together videos about their experience. What is included will be their choice, and so you may feature in the final videos. Parents of students involved will be given a copy of their child's video as a permanent record of the project.

At the end of the project, we will evaluate what the students have built, and the project as a whole. As part of this, we would like you to take part in an interview about your experiences with the project. This interview will last around 30 minutes, and can be arranged at a time that is convenient to you. Interviews will also be conducted via Teams and will also be recorded.

As well as attending a virtual coding enrichment session with the students and taking part in a follow up interview, you will also be invited to complete an optional questionnaire. As a research group ACoRNS are very aware that research often fails to encompass voices from

the full diversity of the population. We are attempting to address that in our research. We would also like to invite you to complete an optional questionnaire about yourself so that we can better understand whose voices we are representing in our research. You do not have to do this in order to take part in the rest of the study. This questionnaire can be completed electronically and returned to the researcher via the same means as your consent form.

Are there any benefits in taking part?

Though no guaranteed benefits to taking part. However, I hope that you will enjoy attending the session. I also hope that you will learn a bit more about what it means to employ an autistic young person.

Are there any risks involved?

There are few risks involved. Any data which I use in my own analysis will be anonymised, and pseudonyms will be assigned to refer to you in my own reporting of the project.

What data will be collected?

My own analysis will make use of the worksheets which the students will fill with their own ideas, the video records created by the students, and any data from our collaboratively planned evaluations, such as your interview. I may also show the videos at presentations about the project, but I will not share them or make them public without your consent.

Your name, and contact information will be collected through completion of the consent form, these will only be used to contact you, should we need to. They will not be used for any other purposes or passed on to third parties. Your name will be kept confidential, and any reports on the project will make use of pseudonyms to maintain your anonymity.

If you choose to complete the optional questionnaire, you will also provide information about your age, gender, ethnicity and any disabilities you experience. Information from this questionnaire will be used to describe the participant group as a whole, and will not be used to identify you directly.

Your consent forms will be stored securely, and you will be assigned a pseudonym which will be used to refer to the rest of your data. This data will be stored on the university network, and on encrypted devices belonging to me, the researcher. Video recordings of the evaluation interview will be deleted once transcription and analysis has been completed. Direct quotations from transcripts may be used in written reports of the project. However, where direct quotations are used, your name will not appear alongside the quotations to maintain your anonymity.

Will my participation be confidential?

Given the contribution of the school and their staff to this project, the school itself will be a named contributor to the work. As the project is taking place at school during the coding enrichment sessions, your participation will be known to the students and staff at Fairmead School. Beyond this, your participation and the information we collect about you during the course of the research will be kept strictly confidential.

Only members of the research team and responsible members of the University of Southampton may be given access to data about you for monitoring purposes and/or to carry out an audit of the study to ensure that the research is complying with applicable regulations. Individuals from regulatory authorities (people who check that we are carrying out the study correctly) may require access to your data. All of these people have a duty to keep their information, as a research participant, strictly confidential.

Your name will only be recorded on the consent form. Consent forms will be stored securely on encrypted devices which only the researchers have access to.

I may take notes during coding club, in which case I will use your first name only. When these notes are typed up, your name will be replaced by your pseudonym, and the physical copies will be destroyed. Your name will never be used directly in reports on the project, instead I will use a pseudonym to refer to you and your contributions.

Do I have to take part?

No, it is entirely up to you to decide whether or not they take part. If you decide you want to take part, you will need to electronically complete a consent form to show you have agreed for them to take part.

You can let me know that you are interested in taking part by emailing me (Verity: V.C.S.Ward@soton.ac.uk), or Ben Crump [email redacted], who is assistant head at Fairmead School.

What happens if I change my mind?

You have the right to change your mind and withdraw at any time without giving a reason and without your rights being affected.

You can withdraw by emailing me or Ben Crump.

If you choose to withdraw from the study we will make sure any footage of you is not used in the students' video records of the project. Once these have been made, however, it will not be possible to withdraw this footage from the study.

Given the highly collaborative nature of the project, I will not be able to remove your other contributions to the project. Similarly, it may not be possible to remove data which has already been anonymised.

What will happen to the results of the research?

Your personal details will remain strictly confidential. Research findings made available in any reports or publications will not include information that can directly identify them without your specific consent.

The results of the research will be written up into a final report which will be submitted towards my PhD. The results may also be published in academic journals.

While I do not intend to use the data for further studies, I am required by ESRC, who have funded this research, to upload anonymised data to a national database. The repository will only be accessible to researchers from UK higher education institutions and will not be available to the general public. Researchers will be required to gain ethical approval from their own institutions before they use the data in any future studies.

Where can I get more information?

For further information about the study you can contact me, the researcher, (as above) and I can answer any questions you have about taking part.

What happens if there is a problem?

If you have a concern about any aspect of this study, you should speak to me or Ben Crump, we will do our best to answer your questions.

If you remain unhappy or have a complaint about any aspect of this study, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Data Protection Privacy Notice

The University of Southampton is legally obliged to protect and use the data collected in this project in specific ways. This can sound very complicated but the main thing to let you know is that this means that we treat any information provided within research projects with very high levels of care and consideration.

There is detailed information about this that we are required to let you know, and this can be found at the end of this form.

Thank you.

Thank you for taking the time to read the information sheet and considering taking part in the research.

More details about Data Protection and Privacy

The University of Southampton conducts research to the highest standards of research integrity. As a publicly-funded organisation, the University has to ensure that it is in the public interest when we use personally-identifiable information about people who have agreed to take part in research. This means that when you agree to take part in a research study, we will use information about you in the ways needed, and for the purposes specified, to conduct and complete the research project. Under data protection law, 'Personal data' means any information that relates to and is capable of identifying a living individual. The University's data protection policy governing the use of personal data by the University can be found on its website (https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page).

This Participant Information Sheet tells you what data will be collected for this project and whether this includes any personal data. Please ask the research team if you have any questions or are unclear what data is being collected about you.

Our privacy notice for research participants provides more information on how the University of Southampton collects and uses your personal data when you take part in one of our research projects and can be found at http://www.southampton.ac.uk/assets/sharepoint/intranet/ls/Public/Research%20and%20Integrity%20Privacy%20Notice/Privacy%20Notice%20for%20Research%20Participants.pdf

Any personal data we collect in this study will be used only for the purposes of carrying out our research and will be handled according to the University's policies in line with data protection law. If any personal data is used from which you can be identified directly, it will not be disclosed to anyone else without your consent unless the University of Southampton is required by law to disclose it.

Data protection law requires us to have a valid legal reason ('lawful basis') to process and use your Personal data. The lawful basis for processing personal information in this research study is for the performance of a task carried out in the public interest. Personal data collected for research will not be used for any other purpose.

For the purposes of data protection law, the University of Southampton is the 'Data Controller' for this study, which means that we are responsible for looking after your information and using it properly. The University of Southampton will keep identifiable

information about you for 10 years after the study has finished after which time any link between you and your information will be removed.

To safeguard your rights, we will use the minimum personal data necessary to achieve our research study objectives. Your data protection rights – such as to access, change, or transfer such information - may be limited, however, in order for the research output to be reliable and accurate. The University will not do anything with your personal data that you would not reasonably expect.

If you have any questions about how your personal data is used, or wish to exercise any of your rights, please consult the University's data protection webpage (https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page) where you can make a request using our online form. If you need further assistance, please contact the University's Data Protection Officer (data.protection@soton.ac.uk).

B.9 Consent forms for technology industry guests

CONSENT FORM

Study title: Widening horizons through participatory design with autistic students

Researcher name: Verity Ward

ERGO number: 54356

Please initial the box(es) if you agree with the statement(s):

	Your initials go here ↓
I have read and understood the information sheet v1.1 16/09/2020 and have had the opportunity to ask questions about the study.	
I agree to take part in this research project and agree for my data to be used for the purpose of this study.	
I understand my participation is voluntary and I may withdraw at any time for any reason without my rights being affected.	
I understand that if I withdraw from the study that it may not be possible to remove my data once my personal information is no longer linked to it.	
I understand that I will not be directly identified in any reports of the research.	
I understand that taking part in the study involves video recording which will be used to create videos about the project.	
I understand that recordings of the virtual meetings may be used as part of these videos.	
I understand that these video records may be shown when this project is presented in academic talks, but that they will not be made publicly available without my permission.	

I understand that parents and guardians of students involved in the project will receive copies of the videos the children create, and that I may feature in their videos.	
I understand that the project evaluation involves interviews which will be recorded. Audio recordings will be transcribed and then destroyed for the purposes set out in the participation information sheet.	
I understand that I may be quoted directly in reports of the research, but that I will not be directly identified (e.g. that my name will not be used)	
I understand that personal information collected about me such as my name will not be shared beyond the study team.	

Optional - please only <u>initial</u> the box(es) you wish to agree to:

I agree to take part in the optional questionnaire about myself.	
I understand that completing this questionnaire will involve providing information about my gender, age, ethnicity and disability status.	
I understand that any information I provide as part of the questionnaire will be used to describe the participant group as a whole and will not be used to identify me directly.	

Name of participant (print name).....

Signature of participant.....

Contact number/email address .....

Date.....

Name of researcher (print name).....

Signature of researcher .....

Date.....

B.10 Information sheet for adult interviewees

Project Information for Interviewees: Widening horizons through participatory design with autistic students

Researcher: Verity Ward

You are being invited to take part in a research study.

This document provides information about the project.

You can contact Verity, the researcher, or Mr Crump if you have any questions.

If you are happy to take part you will be asked to sign a consent form.

What is the research about?

This is a collaborative project between me, Verity Ward, and Fairmead School. Together we will investigate whether involvement in the computer game design project can change ideas about future career options for autistic young people and young people with other special educational needs.

During coding enrichment we have designed, built, and tested computer games. Now we are investigating people's experiences of the project.

I am a PhD researcher at the University of Southampton Education School, I work in the ACoRNS research group. This study will form part of my PhD, which is funded by ESRC.

Why have I been asked to take part?

Either you have already been involved in the project, directly as a participant, or you are a member of staff at Fairmead who works closely with students taking part. This part of the research will investigate your experiences of the project.

What will happen if I agree to take part?

You will attend a meeting via Google Classroom. During this meeting, you will be interviewed by me, and/or some of the students who have taken part in the project. Some of the other students who have taken part may also attend the meeting. I will let you know who we expect to attend when we arrange your interview.

We will ask you about how you were involved in the project, and what you thought about it.

The meeting will be recorded. If the students do not attend I may show them clips from the interview so they can see what you said.

As a research group ACoRNS are very aware that research often fails to encompass voices from the full diversity of the population. We are attempting to address that in our

research. If you have not already done so, we would also like to invite you to complete an optional questionnaire about yourself so that we can better understand whose voices we are representing in our research. You do not have to do this in order to take part in the rest of the study. Information from this questionnaire will be used to describe the participant group as a whole, and will not be used to identify you directly.

Are there any benefits to taking part?

I hope that the interview will help you reflect on your experiences of the project. You will be provided a summary of the findings when the project is completed.

Are there any risks involved?

All sessions will follow school and government policy regarding COVID-19 risks. The project does not increase your risk beyond normal activities.

What information will be collected?

I will collect the following information on the consent forms:

- Your name and contact information

This information will be kept confidential. It will not be passed onto other people.

During the project I will also collect the following information for my own analysis:

- the video recordings of the interviews
- any information from the chat

I will transcribe the videos and analyse the transcripts. Any reference to your name will be replaced by a pseudonym as the videos are transcribed. Quotes from the transcripts may be included in reports and presentations about the project. Your name will not appear alongside any quotations used.

If you choose to complete the optional survey we will also collect information about:

- Your age
- Your gender
- Your ethnicity
- Any disabilities you

experience

Will anyone else know I have taken part?

These are the people who will know you have taken part:

- Other students and staff at Fairmead School
- Verity (PhD researcher) at the University of Southampton

No-one else will know you have taken part in the project.

Given the contribution of the school to this project, the school itself will be a named contributor to the work.

I may take notes during the interview, in which case I will use your first name only. When these notes are typed up, your name will be replaced by a pseudonym or job role, and the physical copies will be destroyed.

The information I collect about you will be kept strictly confidential. Your name will never be used in reports on the project; I will always refer to you by your pseudonym or job role (e.g. “teacher” or “TA”).

Managers at the University of Southampton may ask to see the information we collect to make sure the researchers are keeping it safe.

All information will be stored securely on password-protected computers.

Do I have to take part?

No. This is your decision and I don’t mind either way. If you decide to take part, I will ask you to sign a consent form.

What happens if I change my mind?

You change your mind at any time without giving a reason. Please just let me (Verity) know.

Please note, it may not be possible to remove your data from the study if you change your mind after your data has been pseudonymised and Verity has submitted her thesis, and/or published results in journals.

What will happen to the results of the research?

The results of the research will be written up into a report as part of my PhD. The results may also be

published in academic journals. Reports and publications will not include information that can directly identify you without your specific consent.

I am required by ESRC, who have funded my research, to upload anonymised data to a national database. It will only be accessible to researchers from UK higher education institutions and will not be available to the general public. Researchers will be required to gain ethical approval from their own institutions before they use the data.

Where can I get more information?

Please ask me if you have any questions about the project:

v.c.s.ward@soton.ac.uk

What happens if there is a problem?

If you have a concerns about the project, please speak to Verity first.

If you are still unhappy or have a complaint, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Data Protection Privacy Notice

By law, the University of Southampton has to protect and use the information collected in this project in specific ways. This can sound very formal and complicated.

The main thing to know is that we treat any information very carefully. There is detailed information about this that we have to let you know, and this can be found below.

Thank you for taking the time to read this.

Verity Ward

More details about Data Protection and Privacy that we have to tell you

- The University of Southampton carries out research with the greatest care and consideration.
- We have to have a good reason ('lawful basis') for asking for your personal information.
- The good reason is that we are doing research that we think other people might be interested in, and could help them.
- This means that when you agree to take part in a research study, we will only use information (data) about you in the ways that you have been told about in this project information sheet.
- We will not use your information for any other purpose.
- The University's policy about how we use information about you can be found on its website here: https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page and there is more information about keeping your details private here: https://www.mrc.soton.ac.uk/web2/files/2013/04/privacy.pdf.
- Please ask the research team if you have any questions or are unclear what information is being collected about you.
- The University of Southampton is the 'Data Controller' for this study, which means that we are responsible for looking after your information and using it properly.
- The University of Southampton will keep information about you for 10 years after the study has finished. After this, any link between you and your information will be removed.
- If you have any questions about how your information (data) is used you can find more information here: [https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page]

If you need more help or information, please contact the University's Data Protection Officer by email: data.protection@soton.ac.uk

B.11 Consent form for adult interviewees

INTERVIEWEE CONSENT FORM

Study title: Widening horizons through participatory design with autistic students

Researcher name: Verity Ward

ERGO number: 54356

Please initial the box(es) if you agree with the statement(s):

	Your initials go here ↓
I have read and understood the information sheet v1.1 16/03/2021 and have had the opportunity to ask questions about the study.	
I agree to take part in this research project and agree for information about me and my contributions to be used in the study.	
I understand my participation is voluntary and I may withdraw at any time for any reason.	
I understand that I will not be directly identified in any reports of the research.	
I understand that taking part in the study involves video recording. The videos may be edited and shown to student co-creators if they were not present for the interview.	
I understand that Verity will transcribe the videos of the interview, and that these will be used in her analysis.	
I understand that Verity may use quotes from my interview when reporting the results of the research, but that she will use a pseudonym or job role to protect my identity.	
I understand that personal information collected about me will not be shared beyond the study team.	

Optional - please only initial the box(es) you wish to agree to:

I agree to take part in the optional questionnaire about myself.	
I understand that completing this questionnaire will involve providing information about my gender, age, ethnicity and disability status.	
I understand that any information I provide as part of the questionnaire will be used to describe the participant group as a whole and will not be used to identify me directly.	

Your name (print name).....

Contact number/email address .....

Signature.....

Date.....

Name of researcher (print name).....

Signature of researcher .....

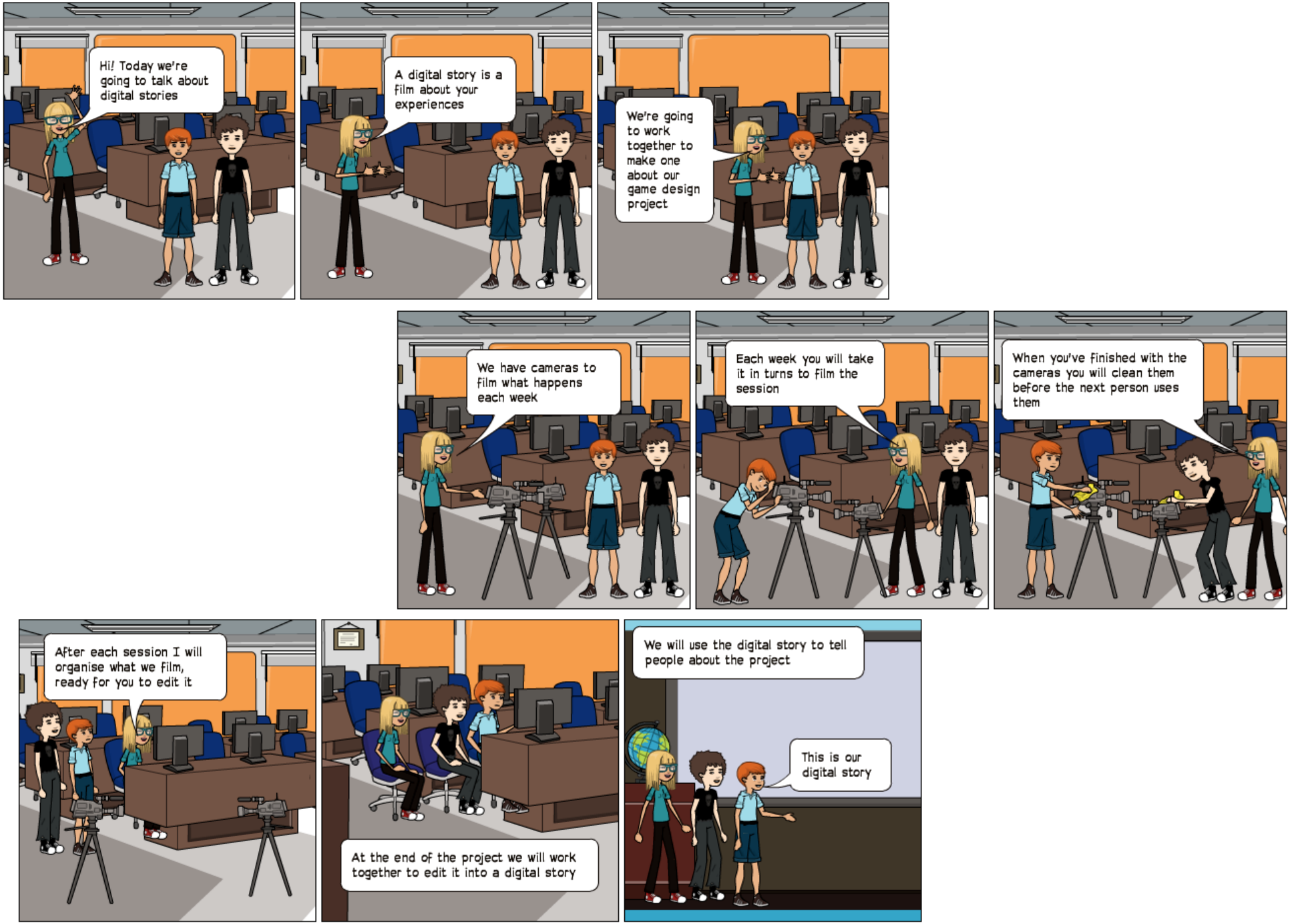
Date.....

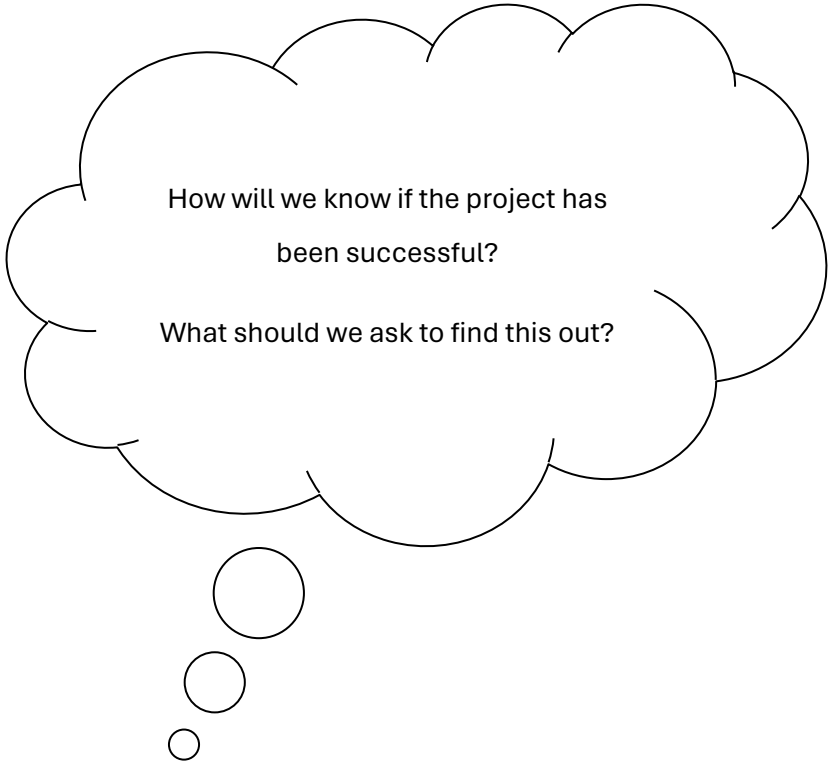
Appendix C Sample resources from study one

C.1 Week 1: introduction to the project and evaluation planning

Week 1 Schedule

	Description	Objectives
Activity 1	Introducing digital stories	☐ We understand what a digital story is and why we are making them ☐ We know that we will take turns to film each week ☐ We understand that the cameras need to be cleaned before another person uses them ☐ We know how the cameras work, and how to film and take pictures
Activity 2	Evaluation planning	☐ We have thought about what is important about the games ☐ We have chosen who should be asked to evaluate the games
Home time		


Hi! Today we're going to talk about digital stories
A digital story is a film about your experiences
We're going to work together to make one about our game design project
We have cameras to film what happens each week
Each week you will take it in turns to film the session
When you've finished with the cameras you will clean them before the next person uses them
After each session I will organise what we film, ready for you to edit it
At the end of the project we will work together to edit it into a digital story
We will use the digital story to tell people about the project
This is our digital story


How will we know if the project has
been successful?
What should we ask to find this out?

How will we know whether our games are good?

They are fun.

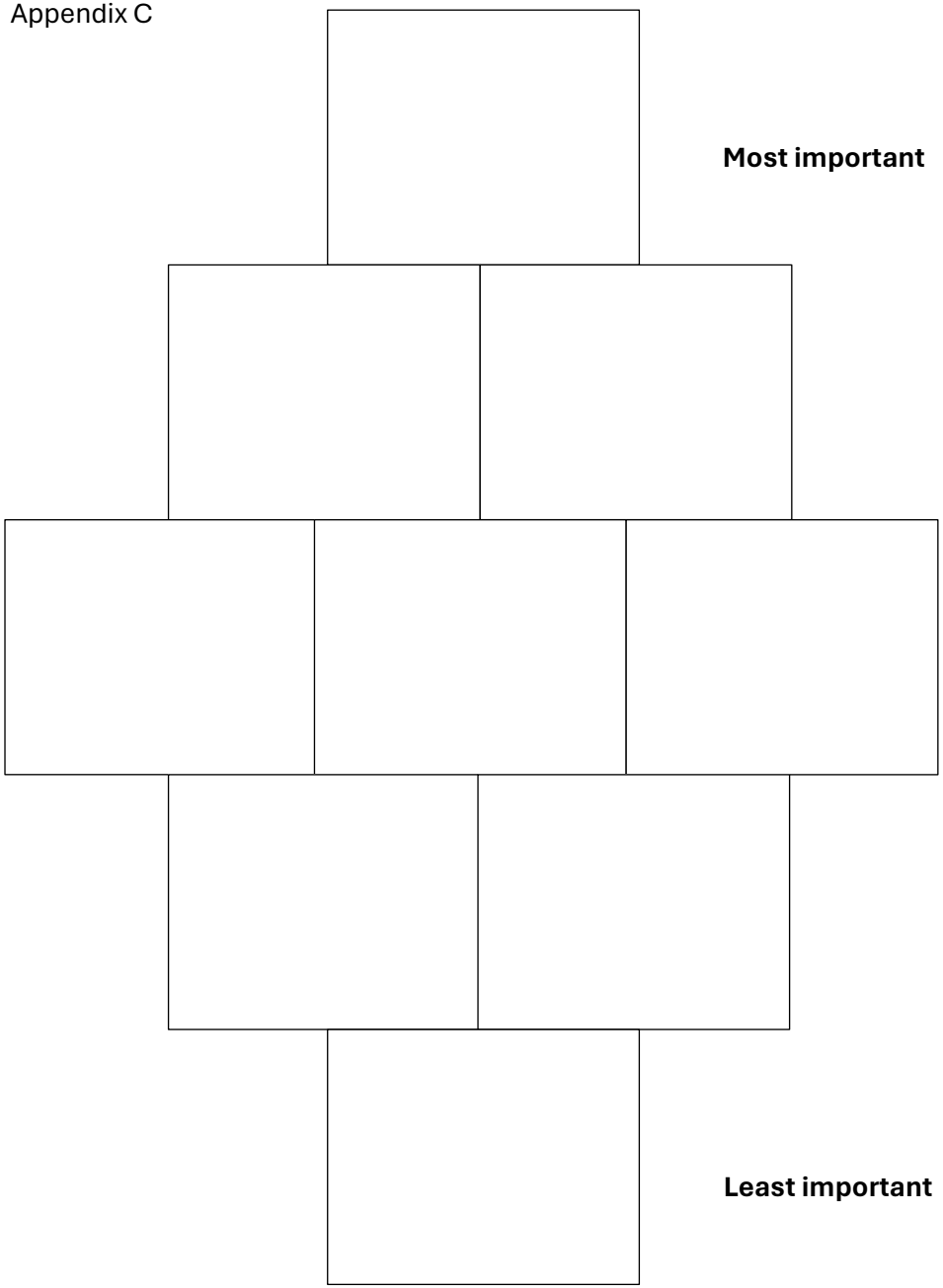
They have cool characters.

The story is interesting.

They are silly.

People want to play them again.

Add your own ideas below:



Most important

Least important

Us- student co-creators

School staff who have helped

Verity

Our friends at school

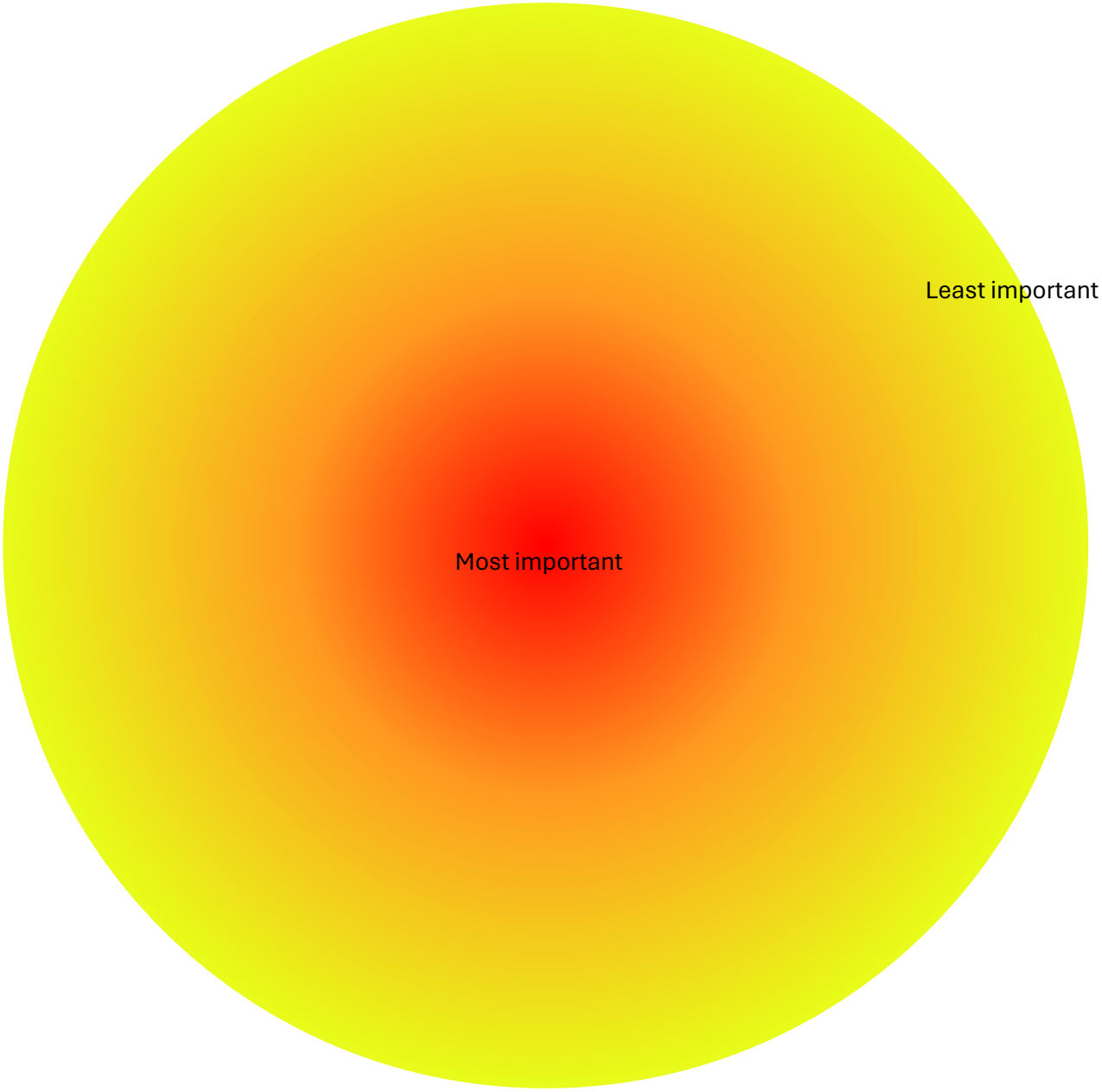
Our parents

Other teachers/staff who know us well

Guest speakers

Who else might we want to

Who should we ask about the games?



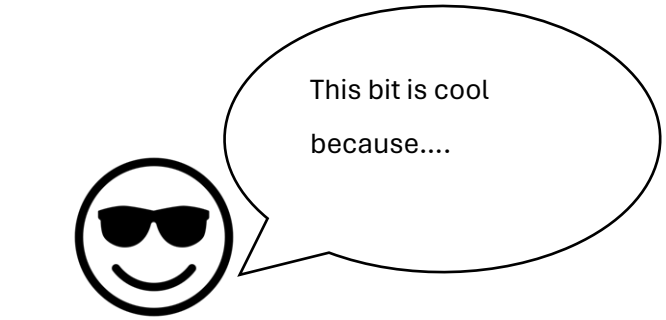
C.2 Week 5: formative feedback on designs with industry guest

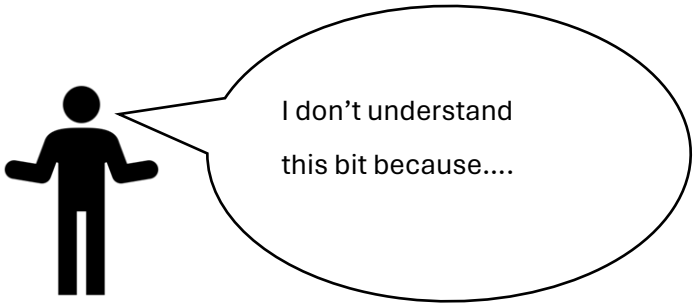
Week 5 Schedule

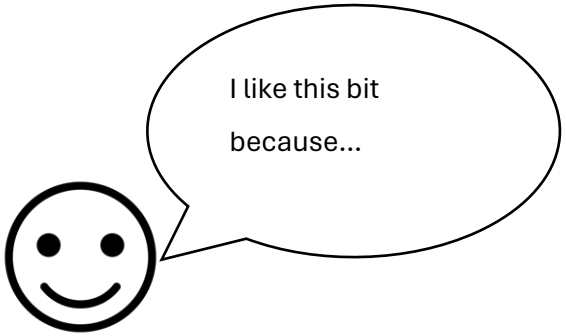
	Description	Objectives
Activity 1	Guest presenter	❑ We have learned about our guest and what they do for a living ❑ We understand how this is relevant to our design project
Activity 2	Feedback on other's ideas	❑ We understand how to give feedback constructively ❑ We have told other groups what we like, and don't like, and why.
Activity 3	Responding to feedback	❑ We have listened to other people's feedback ❑ We have improved our games based on their ideas
End of session		

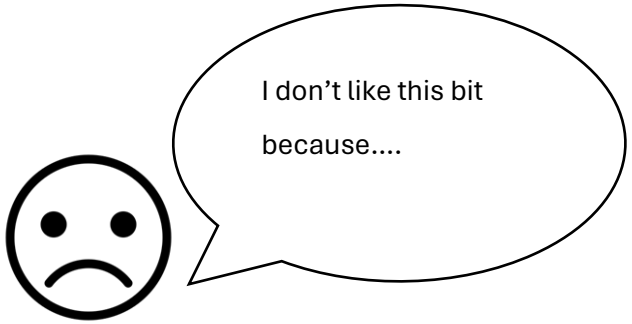
Giving feedback on storyboards

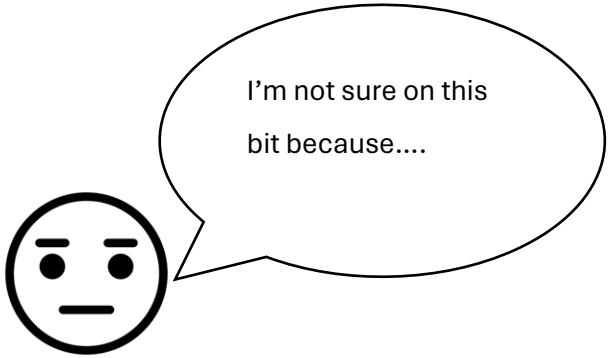
Look back at the storyboard on the next page, use these smileys, and fill in their speech bubbles, or add comments to the google doc to tell the designers what you think. Be kind. Be specific. Explain your comments.





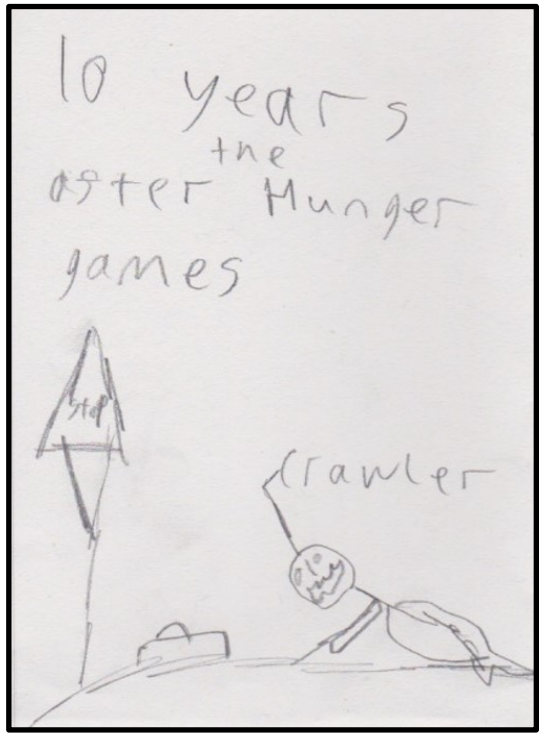


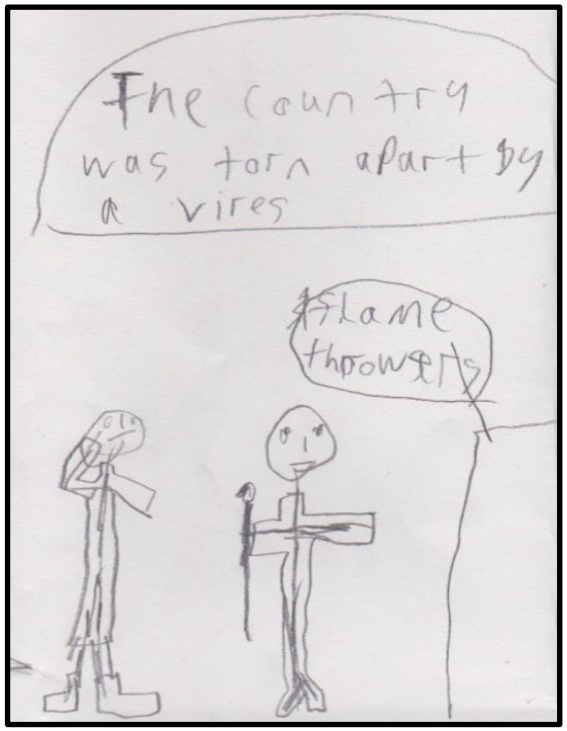




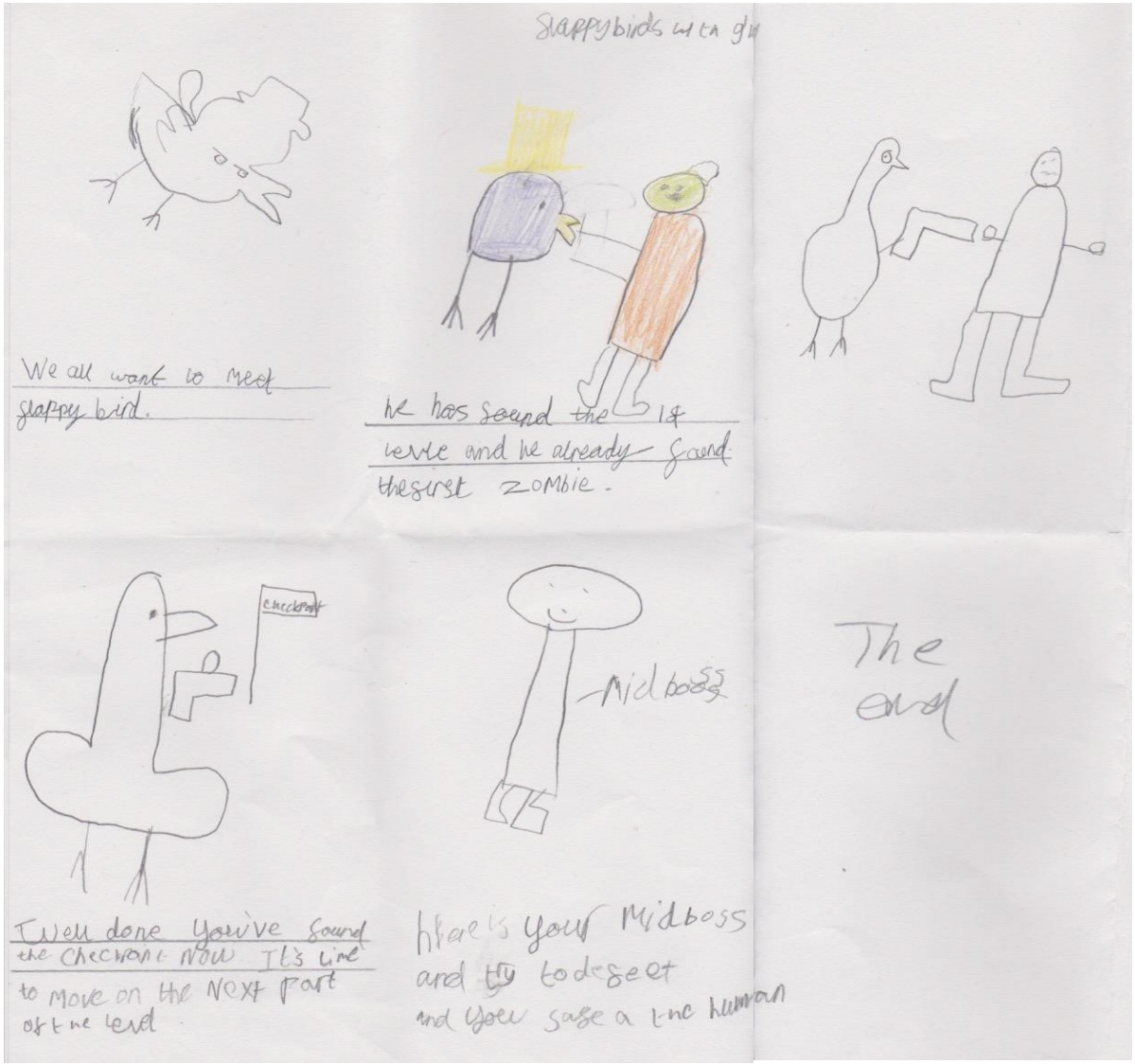
VectorStock

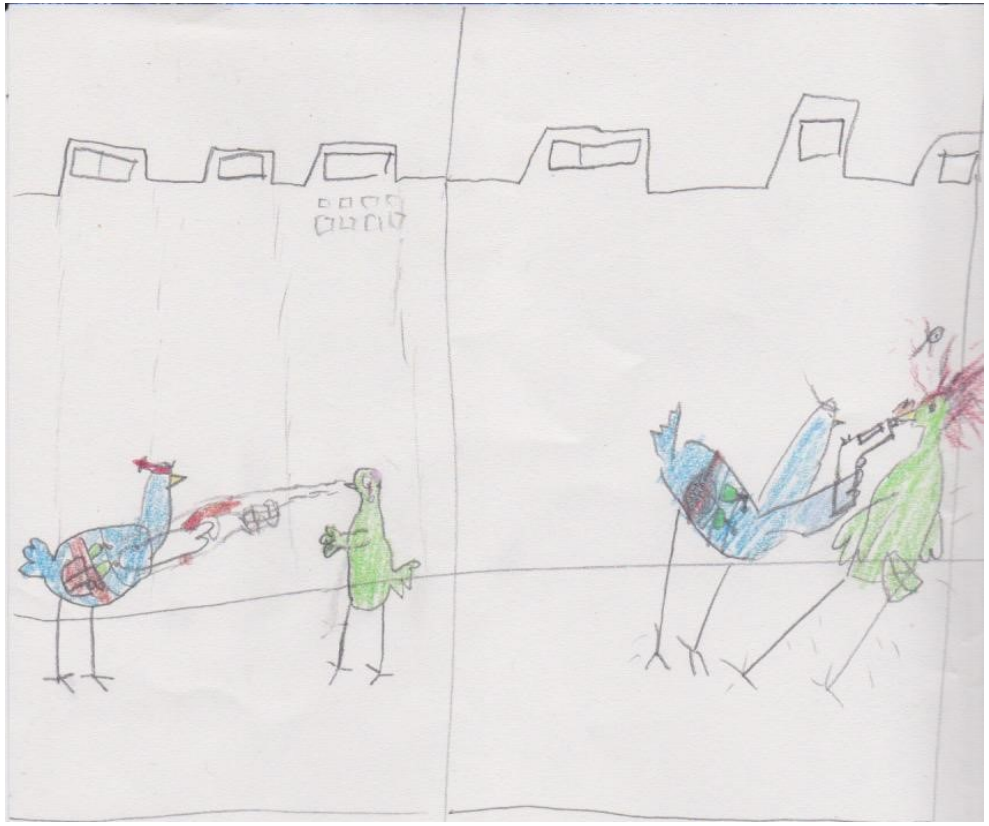
expand and create a story board for the game.
normal
dead
Zombie
The end


10 years after the Hunger games
crawler


The country was torn apart by wires
flame throwers

for my men


Slappybirds with a g
We all want to meet slappy bird.
he has found the 1st
levle and he already found
the first zombie.
checkpoint
Well done You've found
the checkpoint Now It's time
to move on the Next Part
of the level
Midboss
Here is your Midboss
and try to defeet
and you save a the human
The
end



Developing ideas

Based on the other group's feedback what do we need to change?

C.3 Week 12: coding resources

Coding Club 26/03/2021

Make sure you run the code and fix any errors before you do the next step.

Step 1: Open the code with finished character menu in Fuze

If you were here last week, then this is the finished code from last week's worksheet. If you weren't then you can get it from Google Drive, or the memory stick which Verity has.

Step 2: Add code to make the character move with the arrow keys

Copy the following code into the `moveSprite` procedure.

```
 spriteX = GETSPRITEX(playerSprite)
spriteY = GETSPRITEY(playerSprite)
IF SCANKEYBOARD(SCANLEFT) = TRUE THEN
    SETSPRITEFLIP(playerSprite, 1)
    spriteX = spriteX - speed
    IF spriteX < 0 THEN
        spriteX = 0
    ENDIF
ENDIF
// Add code to move right here
IF SCANKEYBOARD(SCANUP) = TRUE THEN
    spriteY = spriteY + speed
    IF spriteY > maxHeight THEN
        spriteY = maxHeight
    ENDIF
ENDIF
// Add in code to move down here
```

Step 3: Add code to move the character sprite right and down with the right and down arrow keys.

Copy and paste the code for moving left and up, and then modify it so that it moves the character in the other directions.

Step 4: Add code so the bird flaps (if it has an alternative image)

Copy the following code and put it in the `flapChar` function after the line which starts with `LOCAL`.

```
    IF TIME MOD speed = 0 THEN
       newIndex = imageIndex + 1
       IF newIndex = numImages THEN newIndex = 0
   ELSE
       newIndex = imageIndex
   ENDIF
```

Step 5: Add code to make the gun sprite move with the character's sprite.

Copy the following code into the `positionWeapon` procedure.

```
     spriteX = GETSPRITEX(playerSprite)
    spriteY = GETSPRITEY(playerSprite)
    IF SCANKEYBOARD(SCANLEFT) = TRUE THEN
        SETSPRITEFLIP(weaponSprite, 1)
        shootRight = False
    ENDIF
    weaponX = spriteX - (GETSPRITEW(weaponSprite)/5)
    weaponY = spriteY - (GETSPRITEH(weaponSprite)/3)
```

Step 6: Make sure the gun points the right way with the character

```
    IF SCANKEYBOARD(SCANRIGHT) = TRUE THEN
        SETSPRITEFLIP(weaponSprite, 0)
        shootRight = TRUE
    ENDIF
    IF SCANKEYBOARD(SCANLEFT) = TRUE THEN
        SETSPRITEFLIP(weaponSprite, 1)
        shootRight = False
    ENDIF
```

Copy the following code and put it before the `weaponX` and `weaponY` variables.

Step 7: Add in code to make the gun shoot when you press [f]

```
IF SCANKEYBOARD(SCANF) = TRUE THEN
    IF direction = TRUE THEN
        bX = GETSPRITEX(weaponSprite) + (GETSPRITEW(weaponSprite)*0.72)
        bY = GETSPRITEY(weaponSprite) + (GETSPRITEH(weaponSprite)*0.7)
    ELSE
        // What should happen if it points the other way?
    ENDIF
    PLOTSPRITE(bulletSprite, bX, bY, 0)
ENDIF
```

Copy the following code into the `shoot` procedure.

Step 8: Add code so that the bulletSprite appears in the right place when the gun is pointing the other way.

Set the `bX` and `bY` variables, when the `direction` variable is not `TRUE`.

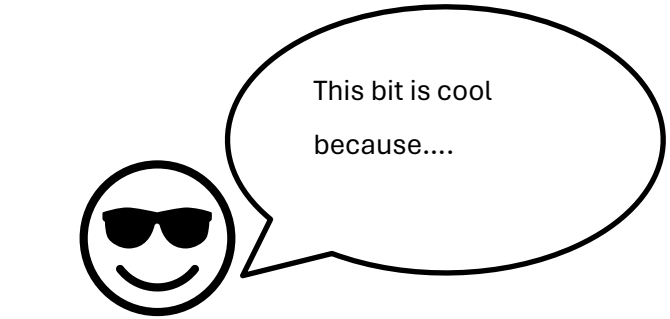
C.4 Week 15: game testing with an industry guest

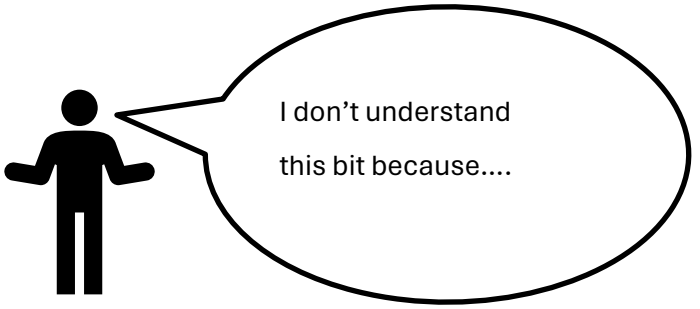
Week 15 Schedule

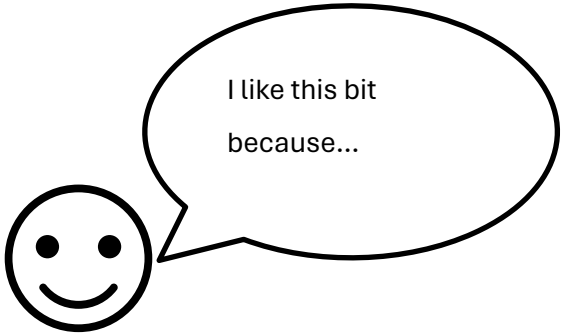
	Description	Objectives
Activity 1	Guest speaker	☐ We have learned about our guest and what they do for a living ☐ We understand how this is relevant to our design project
Activity 2	Testing the games	☐ We have tried using the game ourselves ☐ We have showed what we thought about the game ☐ We have taken notes about how it went
Activity 3	Planning improvement	☐ We have made a plan for what we would like to improve in our games
Activity 4	Make improvements to game	☐ We have started making the improvements we planned in the last activity
Home time		

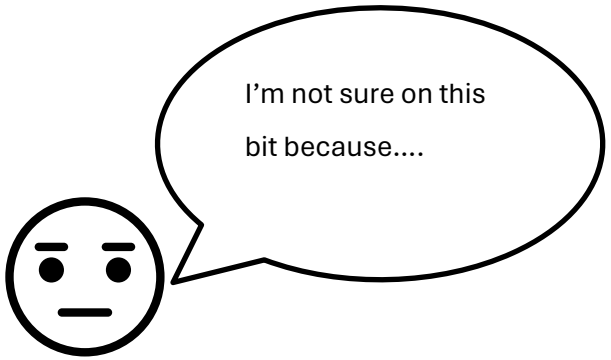
Giving feedback on games

Play the game then use the screen shots and these smileys to tell the designers what you think about the game. Be kind. Be specific. Explain your comments.









Press Q to exit
Press ENTER to choose character

Game testing- maker notes

Take notes while the other people test your game, these will help you plan how to make it better.

Explain what happened when they tested your game…	What went well…	What needs to be improved…

C.5 Week 19: coding resources

Coding Club 11/06/21

After each step make sure you run the code and fix any errors before you do the next step.

Make sure you put the code for each step in the right place

Open the code for this week in Fuze

If you are using a desktop, you can find it on the 'P' drive, in the 'coding' folder. Make sure you copy the whole folder for today to somewhere in your 'Documents' folder.

If you are using a Fuze computer, Verity will give it to you from her USB stick.

We are going to be working with sound today, so you may want to use some headphones.

Step 1: Add code so that the game shows the opening screen

On line 24, change the music file to "musicKv1.mp3"

```
openScreen = NEWSPRITE(1)
LOADSPRITE("openScreen.jpg", openScreen, 0)
PLOTSPRITE(openScreen, 240, 0, 0)
UPDATE
WAIT(2)
HIDESPRITE(openScreen)
```

Step 2: Change the end screen so that it shows different pictures if you have won or lost the game

```
endSprite = NEWSPRITE(2)
LOADSPRITE("gameWin.png", endSprite, 0)
LOADSPRITE("gameLose.png", endSprite, 1)
```

Copy the following code into the beginning of the `endGame` procedure, on line 236.

Now copy the following code into the loop of the endGame procedure, on line 245.

```
IF won = TRUE then
    PROC plotSpriteCentre(endSprite, 0)
ELSE
    PROC plotSpriteCentre(endSprite, 1)
ENDIF
```

Step 3: Add a third level with toucan zombies

Copy the following code into the `levelThree` procedure.

```
WAIT(1)
CLS
STOPMUSIC
backgroundMusic = LOADMUSIC("musicK2.mp3")
PLAYMUSIC(backgroundMusic, 10)
levelStart = TIME
background = LOADIMAGE("background2h.png")
PLOTIMAGE(background, 0, 0)
startscore = score
maxHeight = GHEIGHT*0.5
PROC plotSpriteCentre(charSprite, 0)
// Set up zombies for level
zombiePace = 4
numZombies3 = 3
PROC setUpZombies(numZombies3, "toucan_zombie.png", "toucan_dead.png")
DIM zombieXs(numZombies3)
FOR count=1 TO numZombies3 STEP 1 LOOP
    zombieXs(count) = RND(GWIDTH)
REPEAT
// MAIN GAME LOOP
LOOP
    PROC controlPlayer()
    PROC moveZombies(numZombies3, startscore, True)
    lives = FN checkLives(lives, numZombies2, charSprite)
    UPDATE
    IF score = numZombies2 + startscore THEN PROC endGame(score, True)
    IF lives = 0 THEN PROC endGame(score, False)
REPEAT
```

Step 4: Make the toucan zombies start at the top of the screen

```
zombieX = zombieXs(count)
IF directions(count) = TRUE THEN
    PLOTSPRITE(zombie, zombieX, GHEIGHT, 0)
    SETSPRITEFLIP(zombie, 1)
ELSE
    PLOTSPRITE(zombie, zombieX, GHEIGHT, 0)
ENDIF
```

Copy the following code into the `moveZombies` procedure.

Step 5: Make the toucan drop down the screen

In `CASE 1` of `moveZombies`, use an `IF` statement to check if the zombie is at the right height on the screen, you will need to compare `newY` and `zombie`.

Use an `ELSE` statement to change the `newY` so that the toucan moves down the screen.

HINT: Look at the code for step 4 to see how an IF/ELSE statement works

Alternative activities

Game testing

- How many zombies should we have on each level?
- How many lives should you start with?

Music

- New background music for the main game levels and introduction
- Background music for “game over” screen

Instructions

- Write instructions for how to play the game- what are the controls? How do you move the character? Fire your weapon? Choose a character?

C.6 Week 22: planning digital stories

2nd July 2021- Schedule

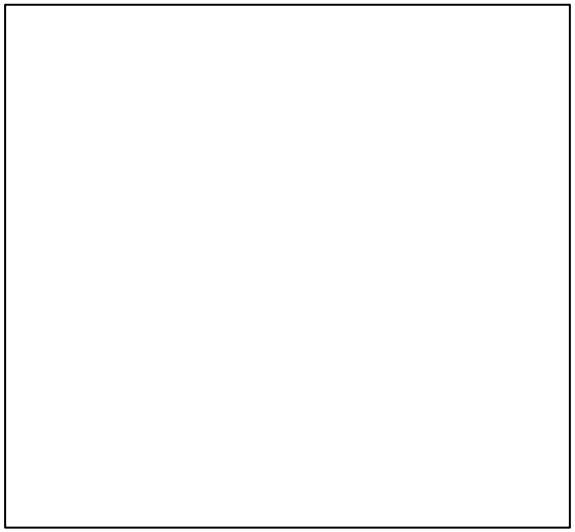
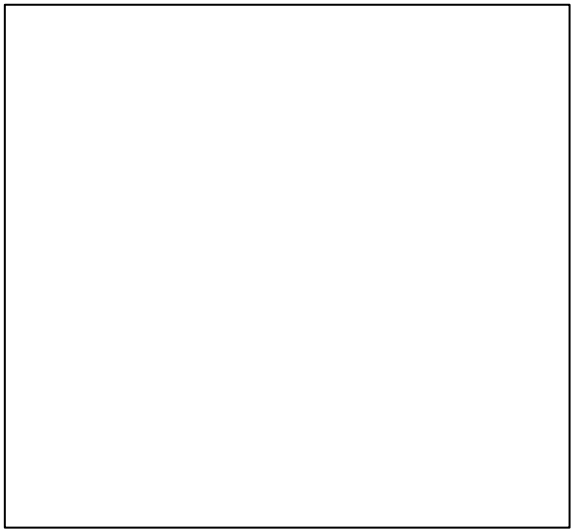
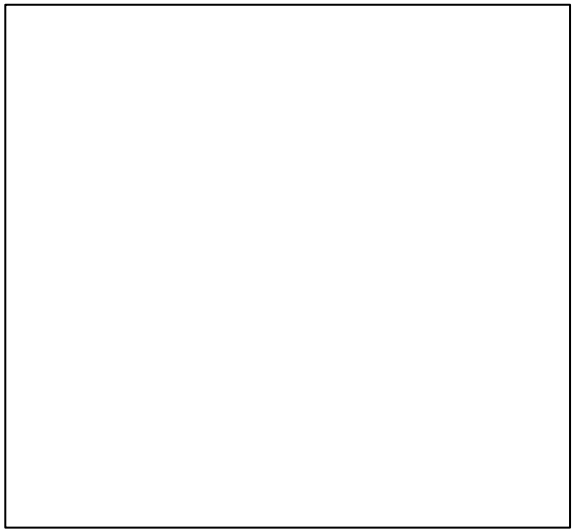
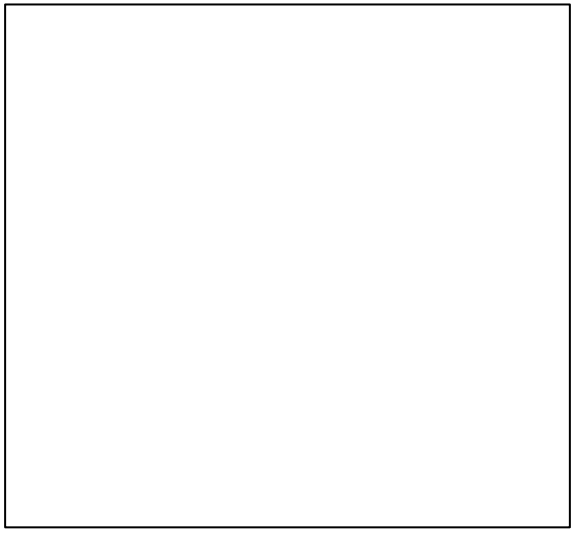
	Description	Objectives
Activity 1	Brainstorming	☐ We have thought about what we did for the project ☐ We have decided which are the most important bits to tell everyone about
Activity 2	Storyboarding	☐ We have created a story board to show our ideas
Activity 3	Interviews	☐ We have interviewed someone else ☐ We have been interviewed
Home time		

What did we do?
What should we tell others about the project?
What were the best bits?

Your digital story

Look back at your ideas from the last activity. Decide how you might put them together to tell your story about the project.

Your digital story- continued…

Interview questions

- How were you involved in the project?
- Did you enjoy taking part?
- What was the best thing about taking part?
- Did anything surprise you about taking part?
- What did you learn from taking part?
- What did you learn from other people who also took part?
- What have you learned about design?
- What have you learned about working in tech?
- How well do you feel the game fits the design brief to be used as a reward in exchange for e-praise points?
- What is your favourite thing about the game?
- How could we improve the game?

For adults:

- Has being involved changed how you think about your work? How?

For students:

- How would you like to extend the project?
- What else would you like to do during coding?

C.7 Demographic questionnaire for adult participants

(Optional) Demographic Information Questionnaire

Study title: Widening horizons through participatory design with autistic students

Researcher name: Verity Ward

ERGO number: 54356

Participant Number: .....

Please remember, completion of this questionnaire is optional, you can participate in the study without completing this questionnaire. If you do not wish to complete this questionnaire you can hand it back to the researcher blank, and it will not affect your participation in the rest of the study.

As a research group, ACoRNS are very aware that research often fails to encompass voices from the full diversity of the population. We are attempting to address that in our. Information from this questionnaire will be used to describe the participant group as a whole, and will help us understand better whose voices we are representing in our research. Any information you provide will not be used to identify you directly. It will be treated as confidential and will not be shared beyond the study team.

Please mark or fill in the box(es) that best describe you. All questions are optional*, if you do not want to provide the answer for any question, leave it blank, or choose the "prefer not to say" option.*

1) What is your ethnic group?		
White	English/Welsh/Scottish/Northern Irish/British	
	Irish	
	Gypsy or Irish Traveller	
	Any other White background, please describe	
Mixed/Multiple ethnic groups	White and Black Caribbean	
	White and Black African	
	White and Asian	
	Any other Mixed/Multiple ethnic background, please describe	

Asian/Asian British	Indian	
	Pakistani	
	Bangladeshi	
	Chinese	
	Any other Asian background, please describe	
Black/ African/Caribbean/Black British	African	
	Caribbean	
	Any other Black/African/Caribbean background, please describe	
Other ethnic group	Arab	
	Any other ethnic group, please describe	
Prefer not to say		

2) What is your gender?	
Non-binary	
Man	
Woman	
Prefer to self-describe, please do so	
Prefer not to say	

3) What are your pronouns?	
they/them	
he/him	
she/her	
None of the above, please describe	

Prefer not to say	

4) What is your age (in years)?	
16-18	
18-24	
25-34	
35-44	
45-54	
55-64	
65-74	
75 or older	
Prefer not to say	

5) Are you disabled?	
Yes	
No	
Prefer not to say	

f you are disabled, please give details of what we can do to ensure you can participate in our research.

……

C.8 Co-produced interview schedule

For all interviewees:

- How were you involved in the project?
- Did you enjoy taking part?
- What was the best thing about taking part?
- Did anything surprise you about taking part?
- What did you learn from taking part?
- What did you learn from other people who also took part?
- What have you learned about design?
- What have you learned about working in tech?
- How well do you feel the game fits the design brief?
- What is your favourite thing about the game?
- How could we improve the game?

For adult interviewees:

- Has being involved changed how you think about your work? How?

For students:

- How would you like to extend the project?

C.9 Certificate of participation

Certificate of Appreciation

This certificate is presented to

.....

to recognise their valuable contribution as **Co-creator** in their collaborative research project about coding and game design.

It is proudly awarded on behalf of

Verity Ward
PhD Candidate

VCSWard

On 14th July, 2021

FAIRMEAD SCHOOL
'To be the best we can be'

Autism Community Research Network
ACoRNS
Southampton

UNIVERSITY OF Southampton

Appendix D Analysis of study one data

D.1 Micro-level transcript of Jay and Terry's digital story

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:00	1	Mustard yellow background, fades to orange. Then three dappled lighter yellow stripes appear like brush strokes across the screen.				Starts with a percussive rattle, before going into a upbeat rhythmic riff	Writing appears as if from behind the camera and stops on top of the stripes which are central to the frame	we made a game using fuze	White lower case, with transparent specs showing the background behind	
00:00:03	2	The camera looks towards the car park, through the windows to the back of the	In the background, from behind the camera, we hear the researcher			The music continues, a repetitive riff, which is				

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		classroom and some blinds, in soft focus. The cars in the carpark are in focus.	and several students chatting about it being Friday. One student sings and celebrates that it is nearly the weekend.			energetic and positive sounding				
00:00:15		An explosion special effect appears in the centre of the screen, followed quickly by a fireball, smoke and embers as it burns away. The focus remains	The explosion effect makes a "bang" noise							During the first session building the digital stories, the students who made this remarked that they were trying

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		on the cars in the car park								to make the video funny.
00:00:20	3	A bright pink background, with brightly coloured rectangles which appear over the top of each other, and flash to different colours. The rectangles move slightly as the writing appears.				The music continues	The image cuts straight from the cars in the carpark to the plain pink background.	We remember when [REDACTED NAME] first drew his idea	Black capital letters, which are slightly uneven thickness, as if drawn by hand	

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:23	4	The camera focuses on a small hand-held white board, which has been drawn on. The drawing shows a large black circle in the centre of the whiteboard, with smaller black dots in a thick hornzontal line either side of it. The camera shakes slightly, as they do not use a tripod. The camera zooms	Behind the camera, we hear the conversation between the researcher and the student holding the camera.	Verity	So what's this one?					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		in a little and then zooms out to show the desk which the whiteboard is resting on. The is a pencil case, and a whiteboard pen above it, and a folder with communication sheets to the left of the whiteboard. At the bottom of the screen, we see the corner of a pile of whiteboards with more								

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		drawings. A persons' leg is to the right of the desk.								
00:00:24			The researcher gives verbal feedback, reinforcing that she is listening to his ideas. "mmm", "ahh"	Jay	This ones for every... -very ten zombies that I killed a zombie with double health spawns	The music comes to a stop as Jay describes his idea.				

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:35		The researcher picks up a whiteboard from the pile at the bottom of the frame, and puts it on top of the one Jayust described by the student. The next whiteboard shows a horizontal line about 2/3s of the way up the whiteboard. Above the line there is a large black dot, surrounded by smaller black		Verity	Right, ok. And what's this one.					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		dots. Below the line are many shorter horizontal(ish) lines with another large black dot in the middle of the whiteboard below the other large black dot. Jay's hand appears to the bottom left of the frame as he gives the whiteboard to the researcher to put in the middle of the frame.								

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:37		The camera zooms a little closer to the whiteboard and then zooms out to it original position.		Jay	This one has fast zombies.					
00:00:39		The researcher picks up the next whiteboard from the pile at the bottom of the frame and places it onto the new pile in the middle of the frame. This whiteboard has a horizontal line across the middle, with a		Verity	Fast zombies. Ok, and what's this one?					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		large black dot below it. Above is a series of concentric semi-circles like an upside down rainbow in black marker.								
00:00:42		Jay's hand appears in the bottom left corner of the frame. He has a black ring on his first finger and his hand does a grabbing action as he explains his idea.	In the background, we hear another student trying to get the researcher's attention by calling her name several times.	Jay	This one has a random chance of thezombies flying down to grab you.					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:46		The camera shifts to frame the next whitboard in the pile yet to be described. The researcher picks it up as she talks. The next whiteboard has a picture of a large bird, with two lines coming from its beak. The lines encompass a large black dot.		Verity	Right, so they fall from the sky?			Above the picture of the bird, is the word "boss"	Black hand writing in marker pen	
00:00:48				Jay	Yeah					
00:00:49		Verity picks up the whiteboard and puts it on		Verity	And what about this one? One					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		the pile of those they have already talked about. The camera follows it back to the pile of whiteboards they have been discussing.			moment [Name redacted]					
00:00:52				Jay	That's a boss					
00:00:53		Verity points to the bird on the whiteboard.		Verity	That's a what? a boss?					
00:00:54		Jay pulls his hand into a circle as he says takes, as if plucking something from		Jay	A boss which ta-					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		the air. It is shown in the bottom left of the frame as he speaks.								
00:00:54		The researcher picks up the last whiteboard, putting it on top of the pile in the centre of the frame. It has a vertical line down the middle, with a large black dot in the centre of the left side, surrounded above by a serious of small		Verity	Have you seen our Toucan boss that we've got ready? We've got a zombie Toucan ready to go on. And what's this one?			To the left of vertical line, "Do kill", to the right don't kill"	Black hand writing in marker pen	

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		black dots. To the right the smaller dots are grouped much closer into something that resembles a swarm in a Verity shape pointing at the top of another large black dot.								
00:01:03		Jay points to the large black dot on the left. A lightening effect appears from his had and strikes the black dot on the right of the	A lightning noise accompanies the visual effect, and a bang the explosion animation.	Jay	That's if you don't kill the zombies coming out of the holes, then they will spawn double.					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		board. An explosion effect appears on the right black dot afterwards.								
00:01:08		A student pushes the chair to the right of the frame under the table.	The backgroound noise in the classroom gets louder as the rest of the class pack away ready to go home.	Verity	Good job, thank you for telling me, and thank you for recording it					
00:01:11				Terry	So does that mean if you leave it for, so does that mean if you leave it for too-					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:01:14	5	A bright blue background, with brightly coloured rectangles which appear over the top of each other, and flash to different colours. The rectangles move slightly as the writing appears.	There is no sound on this section				Writing appears in the centre of the screen, growing from transparent small writing until it reaches full size and opacity, and flashes white before settling as black.	I copied code from paper onto Fuze	Black capital letters, which are slightly uneven thickness, as if drawn by hand	
00:01:17	6	The footage shows two computers on a desk to the left of the frame, and another on	In the background we hear the researcher, and a teacher talking to				The live sign appears as if from behind the camera, being stamped	LIVE	White capital letetrs on a red background	

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		the edge of the frame to the right on another desk. The desks are set against a plain off-white wall, and you can see the plug sockets below. In the bottom left corner of the frame we see the torso of a child, in a navy blue sweater and grey jogging bottoms. There is a sheet of paper on the desk in front of	some students				onto the bottom left corner of the frame. Once there it flashes to transparent and back again.			

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		the keyboard. The student fiddles with it slightly, pressing it along the bottom of the desk to form a crease where it overhangs.								
00:01:17		An explosion effect is overlaod on the midde of the frame, on the computer screen that the student is working at. Another animation indicating the	The eplosion makes a bang noise, and the LIVE effect makes a ding, like the notification on a phone.							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		footage is LIVE as if boradcasting on 24-hour news is in the bottom left corner, it flashes off and on.								
00:01:20	7	A bright yellow background, with brightly coloured rectangles which appear over the top of each other, and flash to different colours. The rectangles move slightly as					Writing appears in the centre of the screen, growing from transparent small writing until it reaches full size and opacity, and flashes white before	We drew characters created different characters in the game	Black capital letters, which are slightly uneven thickness, as if drawn by hand	

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		the writing appears.					settling as black.			
00:01:23	8	Someone's head covers the bottom left of the frame, in the bacground, we see the classroom, with a student workign across a computer and a laptop. Next to him the window is open, and there is a set of shelves filled with computer	The classroom is noisy. The shot starts with a couple of bangs in the background, and then we here the student filming singing quietly to themself. The researcher chats with the teacher and the student about the							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		components: monitors and Fuze computers. The camera pans round the classroom past the windows to the floor, we see the feet of the student who is filming, and some bags on the floor. The camera spins and jerks about, settling on a portrait image of a teacher and the researcher round a	issue they are encountering.							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		students' computer, wth the student between them. As the camera pans to them, we see another adult stood next to them, looking over to the computers against the wall.								
00:01:38		The camera quickly spins back, to show the student filming's face. We see his nose, his eyes, forehead and hair. His face	The student filming makes a noise to the camera, a gravelly groan, almost. We hearthe noises of the classroom, as							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		quickly disappears out the bottom of the frame, as the camera pans across the classroom to the child sat working with two copmuters again. The camera turns upside down, and we see the egs of the tables and chairs in the middle of the room. Then it turns to show another student	the teacher gets support from the researcher about the issue. A student checks for the next step to resolving the issue. We hear clicking and typing. The student filming makes another noise "hmmm" inqusitively, as we see his face for a second time.							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		working in the corner with headphones on. The camera continues to pan round the room until we see the student filming's face again. He is pouting his lips and looks curiously into the camera.								
00:01:52		The camera quickly pans back to the student working in the corner. Then it wanders,	We hear students and adults chatting about their work. The teacher laughs, as a							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		pointing to the windows, and the celiing, before going back to the lift door in the corner.	student ecitedly shouts they've found the solution to their problem.							
00:02:04		The camera pans from the lift door across the back of the classroom to where the researcher is squatting with her laptop on her knees. The camera wanders round her, showing the teacher's	The students and teacher continue to chat about their work. The teacher jokes, trying to get the student to hold off more action until the researcher has been able to help. The researcher							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		feet as she kneels on the floor next to a student, and then round the back of the group. The camera peers over the researchers shoulder and focuses on her laptop, and the code she is consulting.	asks to see the work the student has already done.							
00:02:24		The camera moves backwards, revealing the students and adults	We hear the background noise of the classroom, with students and staff							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		supporting them. It briefly points to the floor before swinging upwards to find a student and another member of staff sat using laptops in the middle of the classroom.	chatting about their work.							
00:02:30		The camera points towards the student's laptop. His hands are hovering over the track pad and keyboard		Jay	What are you doing here?					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		as he works. On his screen is an image in mostly grey, with a green creature with crosses for eyes. Behind it is a trail of what looks like red blood.								
00:02:32		The camera moves from the laptop towards the student's face.		Hector	Huh?					
00:02:32		The student takes off his headphones to listen		Jay	What are you doing there?					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:02:33		The student chews slightly then turns to look at the camera as he responds.		Hector	I'm doing a bird.					
00:02:35	9	A plain green-blue colour fills the screen. Two white swirls appear above and below the writing.	There is no sound on this section				The writing fades in from the green-blue background until it is fully opaque	The end	White swirly writing, as if at the end of fairytale film	
00:02:38	10	The camera points at a student with dark hair in the centre of the frame. Behind him, we see the lift door, and	We hear the rest of the class in the background, students chat with eachother. The							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		the windows out to the stairs and the carpark beyond. The student turns to face the camera.	background noise continues until the end of the shot.							
00:02:40		The student look straight at the camera as he talks. He points his finger to emphasis "developed". As he asks about the person he looks to the left, at a member of staff out of the frame.		Levi	Coding was first made in 1883, developed by a person called... What was that again?					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:02:47		He looks as Josh responds.		Josh	I think it was binary					
00:02:48		The student turns back to the camera as he starts again.		Levi	Binary! A person called binary					
00:02:50		He looks to the left of the frame, as the other student responds.		Jay	Um, actually...					
00:02:51				Kobi	Binary?!					
00:02:51				Levi	Binary					
00:02:51				Jay	Binary is...					
00:02:52				Kobi	Huh, I'll put you in a bind in a minute					
00:02:54		He turns back to the camera		Levi	Nice					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		as he starts talking again.								
00:02:55		Jay walks into the shot, finger-first as he waves it about trying to correct Levi.		Jay	Act-					
00:02:55				Levi	So...					
00:02:56		He stands to the left of Levi in the frame, and gesticulates to indicate the ones and zeros. Levi looks at him curiously as he listens.		Jay	Actually binary is a se-, is a series of ones and zeros					
00:03:02				Levi	Oh, so it's not a person?					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:03:03		Jay turns and walks out of frame.		Jay	No!					
00:03:04		Levi turns and looks back at the camera, waving his hands to articulate his speech.		Levi	Oh, so it's like a program?					
00:03:06				Jay	Yeah!					
00:03:06		Levi continues to wave his hand in time with each syllable. He lifts his hand to his chin, as if he's just worked something out		Levi	So a program that was made in 1883, but not a person that was made in the coding. Yeah, that					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
					makes sense because,					
00:03:12				Jay	Well, [inudible speech]					Levi continues to talk over Jay, making his voice inaudible
00:03:12		Levi waves his hand in circular motions as he talks		Levi	so many random words...					
00:03:13				Kobi	Yeah, that makes sense					
00:03:15		Levi grasps his fingers as if picking something out the air, making		Levi	And only a smart computer would know such things					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		an ok sign with his other hand.								
00:03:16				Kobi	Really?					Kobi asks sarcastically
00:03:16		Jay walks back into shot looking at the camera and then turns to address Levi, waggling his finger as he does so. He waves his other hand to emphasise his speech, he is holding a yellow and blue juggling ball in his hand.		Jay	Yeah, yeah, fun fact... fun fact					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:03:18		Levi looks at him inquisitivey.		Levi	oh! Yes?					
00:03:20		Levi continues to look Jay in the face, looking a little uncomfortable. Jay holds his hands wide to show a computer as big as his armspan. He walks backwards so that both his hands are visible in shot and faces directly towards the camera.		Jay	In the 80s when... err... in the eight-t-ties, computers were huge, like about, huge, like about this big					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		Then he walks out of shot.								
00:03:33		Levi nods as he talks.		Levi	That's really big. That's really big! That's really, really, really big					
00:03:36		Levi looks at Jay who is out of shot.		Jay	Yeah, now they're very small.					
00:03:38		As he launches back into his spiel, he looks back at the camera, raising his hand and pointing a finger to the audience.		Levi	Ah... So the fact is, coding was first made in 1883, that's a hell of a long time! So how many games					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		He moves his finger in time with his speech, and then holds his hand out as he asks the question.			were being produced back then?					
00:03:46				Jay	A lot					
00:03:47		Levi addresses the camera as he starts to talk, then uses his had to indicate a small amount.		Levi	Not really, not that much...					
00:03:48				Jay	No					
00:03:49		Levi indicates small lengths with his thumb and forefinger with both ands		Levi	Because maybe there are some bits of coding, what some					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		and waves them in the air.			people haven't used before					
00:03:52		Levi looks at Kobi, who is out of shot.		Kobi	Guys, this is dum!					
00:03:54		Levi looks back to the camera as he continues to talk.		Levi	Or some p-, There are some coding things					
00:03:56				Jay	You think it's dum					
00:03:57		He goes back to holding his hands indicating measurements and dances them round each other		Levi	that maybe people never understood, so that's why they wuldn't make in 1883, because they wouldn't have					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
					understanded that.					
00:04:01		Levi looks over to Kobi as he starts to talk, then looks back to camera.		Kobi	Not really, I just...					
00:04:03		Levi walks towards the camera, so that he nearly fills the frame.		Jay	Stop interrupting!					
00:04:04				Levi	But...					
00:04:05				?	Argh					
00:04:05		Levi looks into the camera, as if telling the audience a secret. Then he		Levi	Computers know everything, so back in the 80s maybe					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		moves his hands as he talks, occassionally glancing away. He continues to point and gesticulate, with his hand appearing and dissappearing out of shot. He smiles and walks towards the camera.			they made games back then because they knew how to use coding back then, because it was 1980 not 1883. See ya later, and that's my fact.					
00:04:18	11	A plain green-blue colour fills the screen.	There is no sound on this section				The writing fades in quickly and then fades away more slowly.	made by [name redacted] and [name redacted] helpers:	simple, thin white lettering all in lower case, split across two	

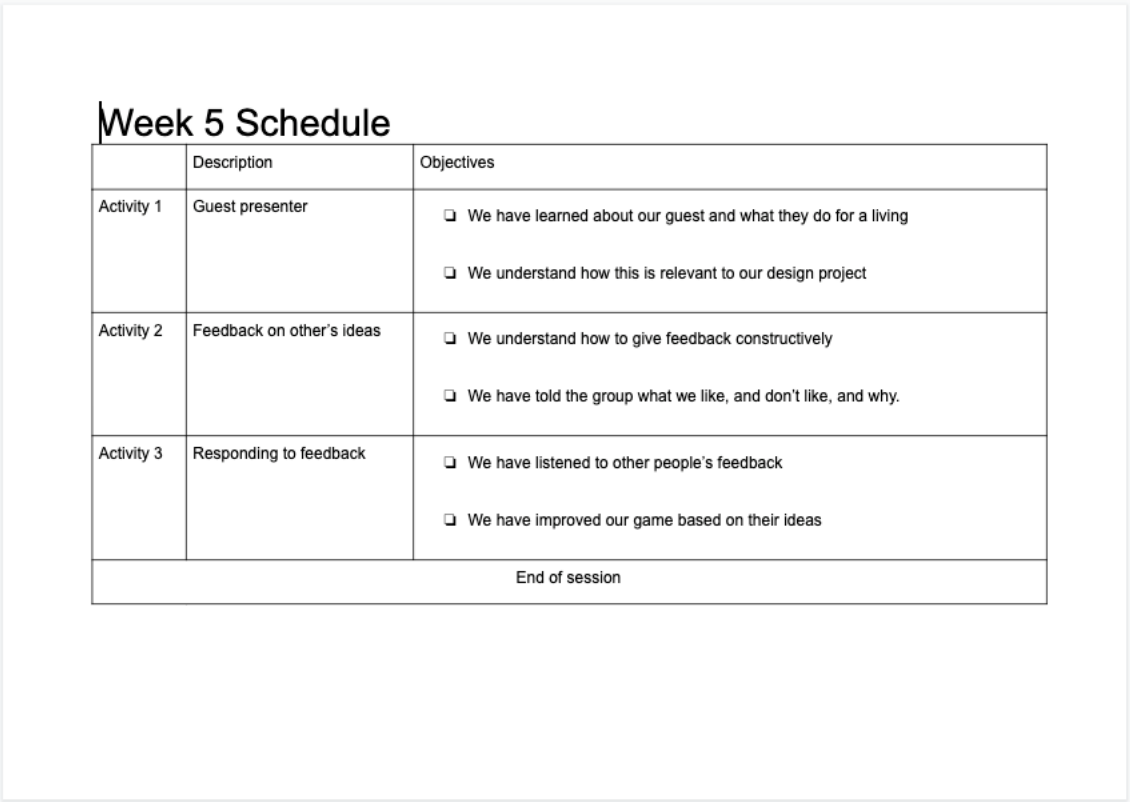
Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
								[name redacted] and [name redacted]	lines in the middle of the shot	

D.2 Macro-level session transcript from week 5

Week 5- 2021/01/29

Today was our first online session with a guest from industry. Fred joined us and spoke to us about his role helping develop software for the hospital. Scarlet, Fiona, Tim, Kobi, Russel, Hector and Connor were in the classroom. Tanya and Ken joined from home. L joined from home a little late. It took a couple of minutes to work send Fred the correct link, but this only delayed the start by a few minutes. I started the session by introducing Fred, and then we went round the room and each introduced ourselves and told each other our favourite computer games. The class were not impressed with Fred's favourite game, which was Fornite, and this sparked some discussion about why he liked it. He explained that he could play it with his brothers and sisters across different gaming platforms. Tanya and Connor introduced themselves but did not say their favourite games. They were both quite quiet throughout the session. Once we had all introduced ourselves I asked Fred to tell us a bit about his work. Then I opened him up to questions from the group. They were quiet to start with, so I asked a few questions I had prepared earlier, about the projects he has been working on and his usual work environment. A couple of students asked about his favourite game, and then Tim asked a question about his work. He didn't seem to have quite understood about Fred's job, so I tried to help by asking Fred to explain a bit more about his work.

Once the questions were exhausted, I moved on the schedule and said Fred would be helping us with some feedback. The first step for this was to explain the game. I asked for volunteers and Russel offered to explain what we had done so far. He explained how we had combined ideas and started explaining about our game. Other students chipped in, and the conversation moved on to further idea generation. I let them talk for a short while and then brought the conversation back to Fred, asking if he understood and whether he had any questions. He asked a few questions about the characters and whether it was single or multiplayer, which the students answered enthusiastically.



Week 5 Schedule

	Description	Objectives
Activity 1	Guest presenter	❑ We have learned about our guest and what they do for a living ❑ We understand how this is relevant to our design project
Activity 2	Feedback on other's ideas	❑ We understand how to give feedback constructively ❑ We have told the group what we like, and don't like, and why.
Activity 3	Responding to feedback	❑ We have listened to other people's feedback ❑ We have improved our game based on their ideas
End of session		

Figure D-1: Schedule for the session with the first guest speaker

We then moved back to looking at the google doc, and I introduced the next task of adding feedback about the storyboards. I asked students to talk through what they had drawn. All were happy to do so, apart from Connor, who again said he did not want to explain his ideas. Then I asked each student to comment on the others' ideas, with some explanation about how we should be kind, and focus on the ideas rather than the drawing skills. I explained they could type directly, use the emojis provided or add comments to the sheet. While they were doing this Fred and I talked through each of the storyboards and he gave feedback on each of them. Though some of them added comments to the storyboards, there were fewer than I expected. A consequence of using these shared documents is also that it is difficult to tell who contributed what to the document afterwards. It is therefore difficult to tell who engaged with this task.

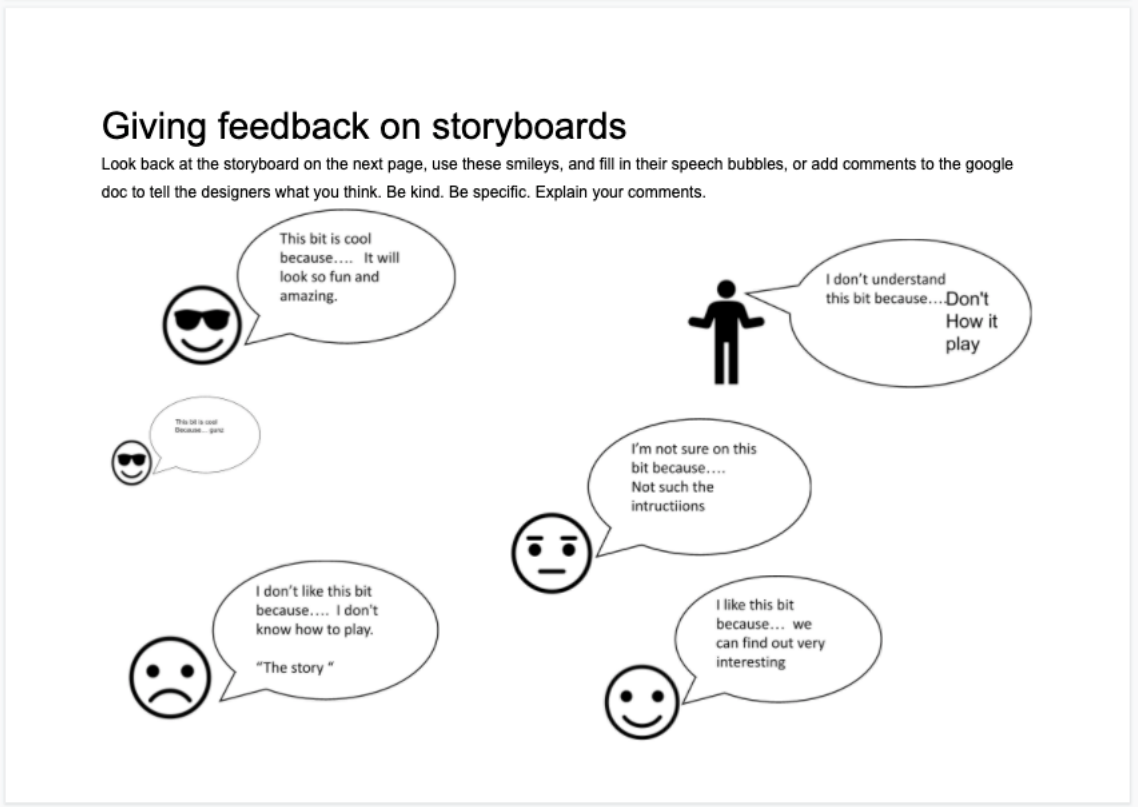


Figure D-2: Page 2 from resources pack which gave structure and a starting point for feedback

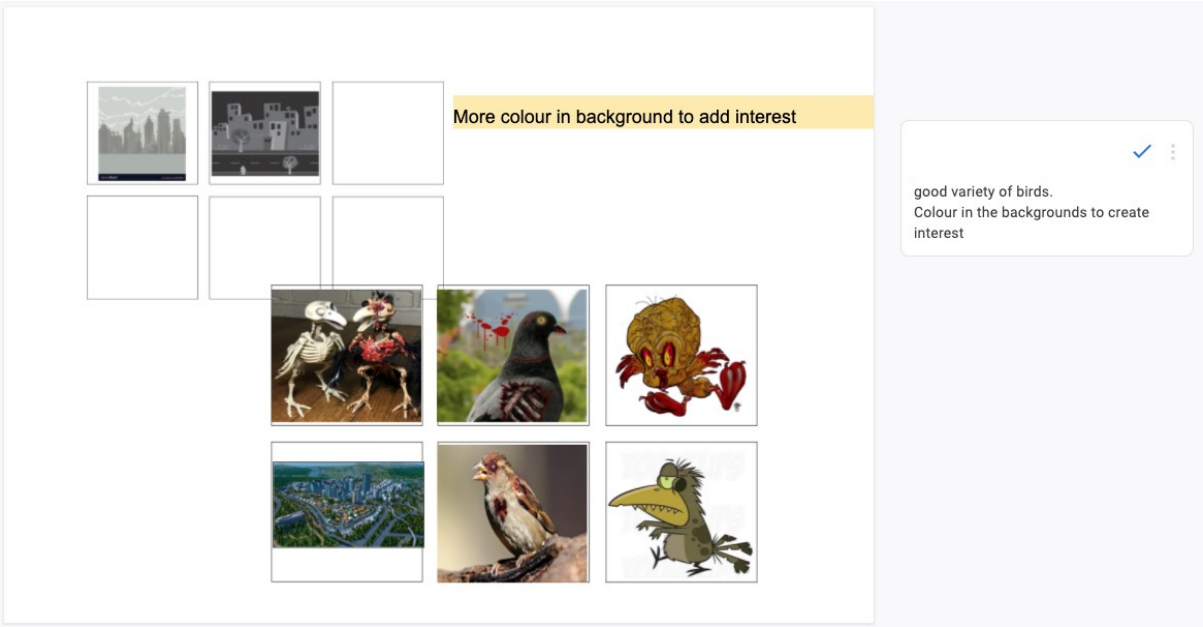


Figure D-3: Page 3 of resources pack where students and guest gave feedback on storyboards

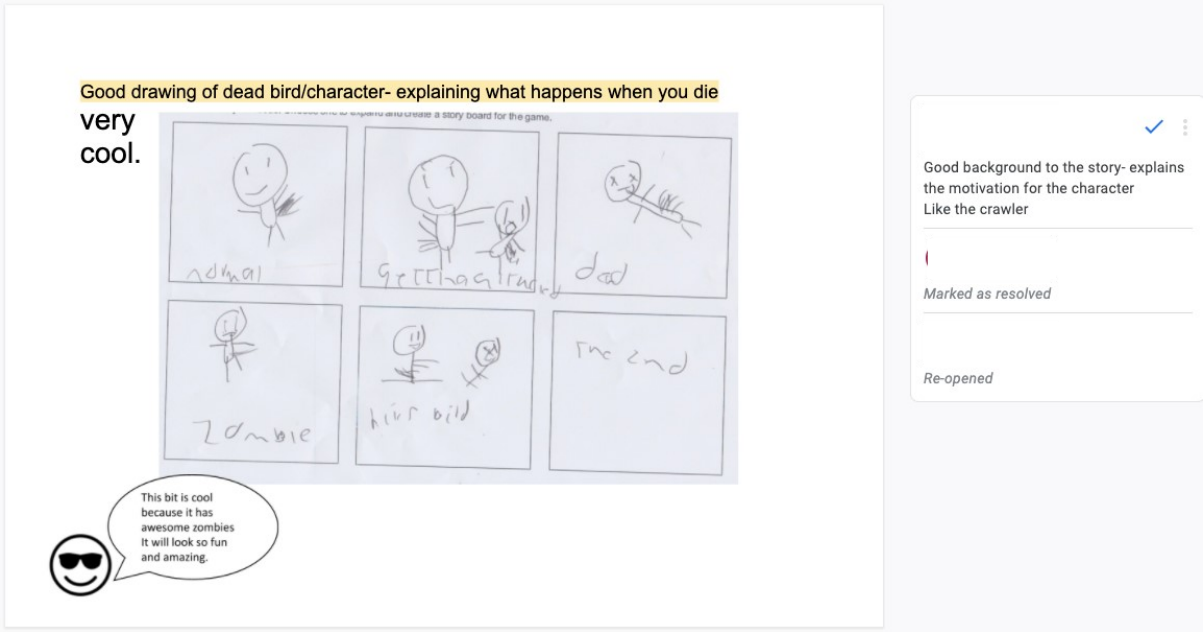


Figure D-4: Page 4 of resources pack where students and guest gave feedback on the storyboard

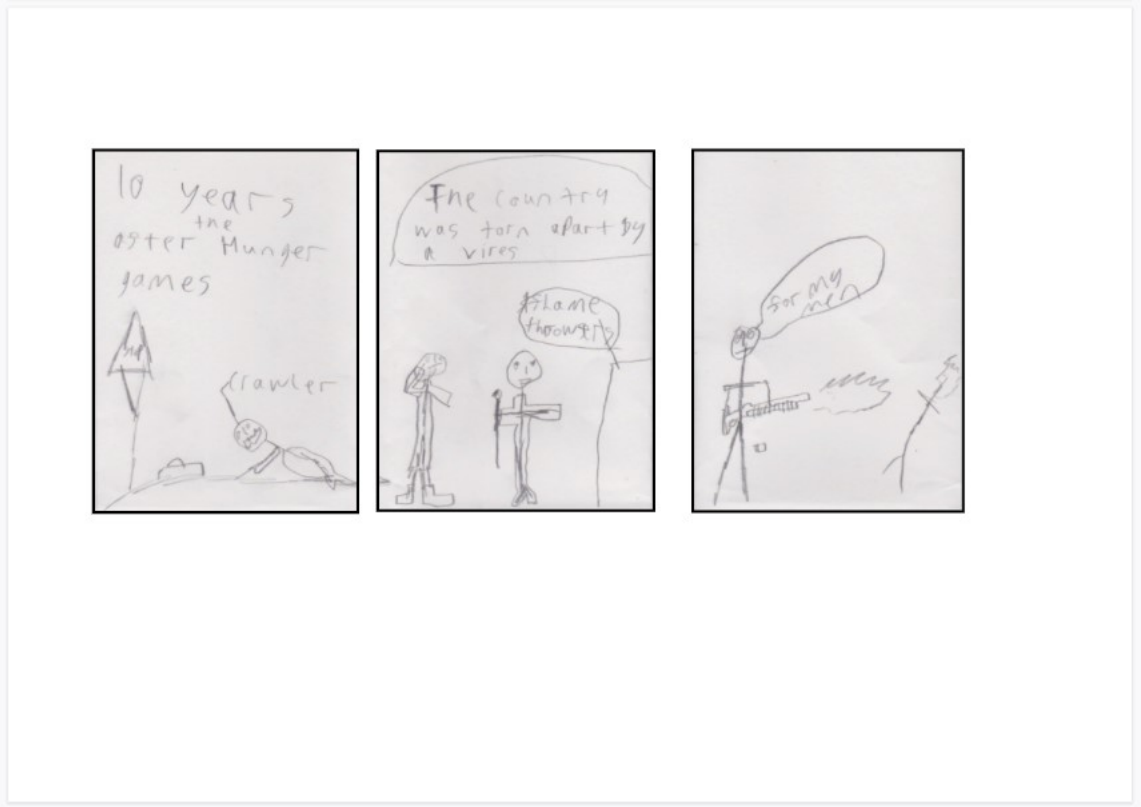


Figure D-5: Page 5 of resources pack, with storyboard from the previous session

Figure D-6: Page 6 of resources pack, with storyboard from the previous session

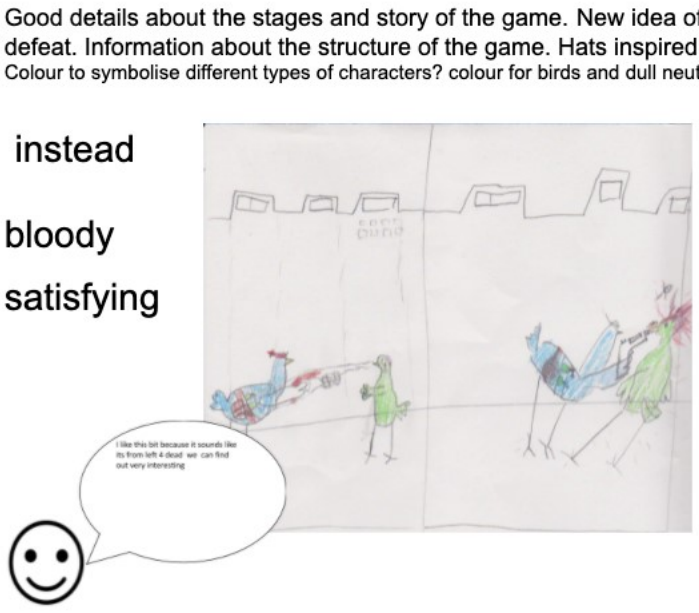


Figure D-7: Page 7 of the resources pack, with feedback on storyboards

When we had finished going through the students' ideas, I asked the students to work on their storyboards more, trying to work in responses to the feedback they had received. They were

given 10 minutes to do this before we needed to finish for the end of the lesson. I suggested that Fred could find some images which I could add to the google doc. He sent me some in an email which I added at the bottom. L also added to this page.

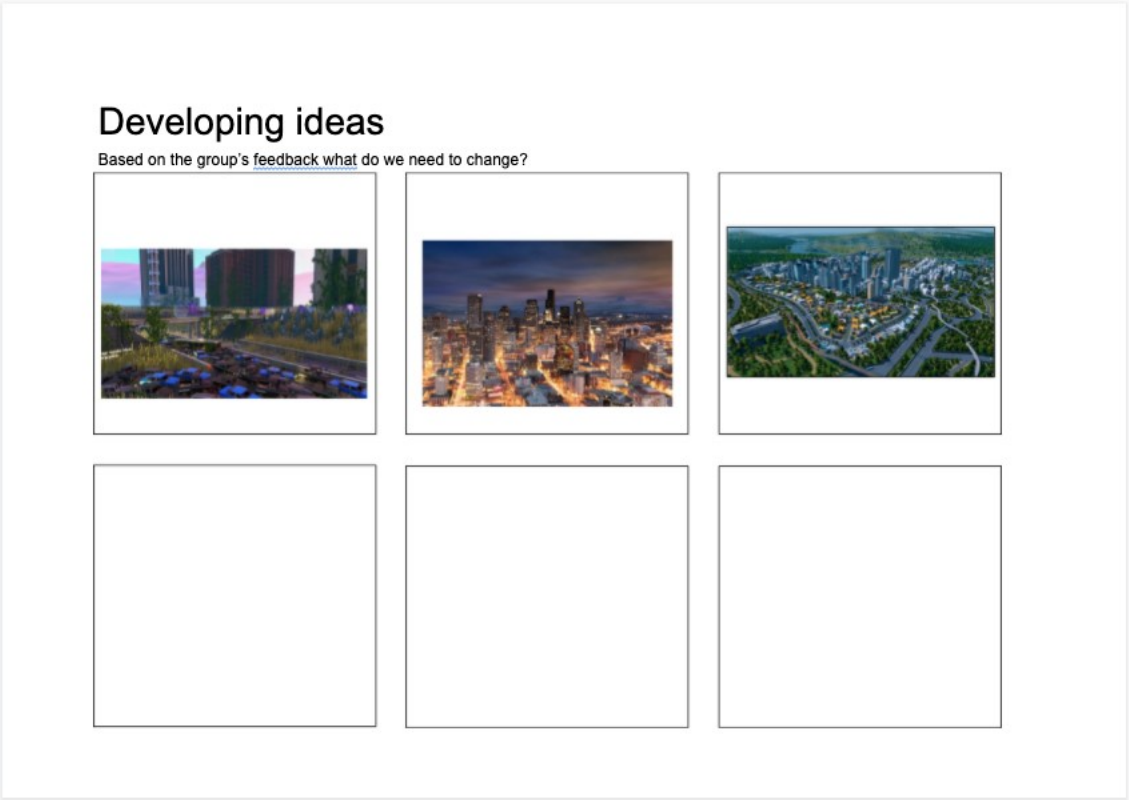


Figure D-8: Online development of storyboards through the shared google doc (pg 8)

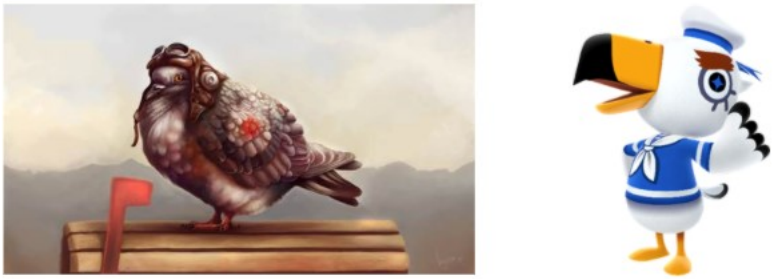


Figure D-9: Online development of storyboards through the shared google doc (pg 9)

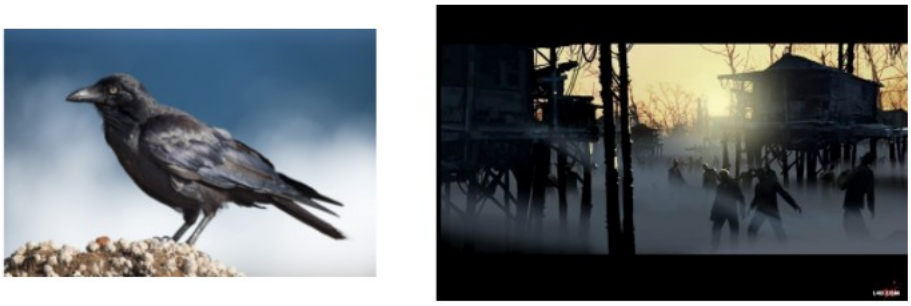


Figure D-10: Online development of storyboards through the shared google doc (pg 10)

Figure D-11: Online development of storyboards through the shared google doc (pg 11)

Tim showed us his progress a couple of times during the time given for them to work on their storyboards. At the end of the given time, I asked him to finish telling us about what he had drawn. We then heard from all of the other students about their updates to the story board. Connor said he did not want to tell us, and Tanya also said she did not want to share her progress. Ken openly admitted he had not done anything to add to his storyboard in that time. At the end of the session we thanked Fred with a round of applause.

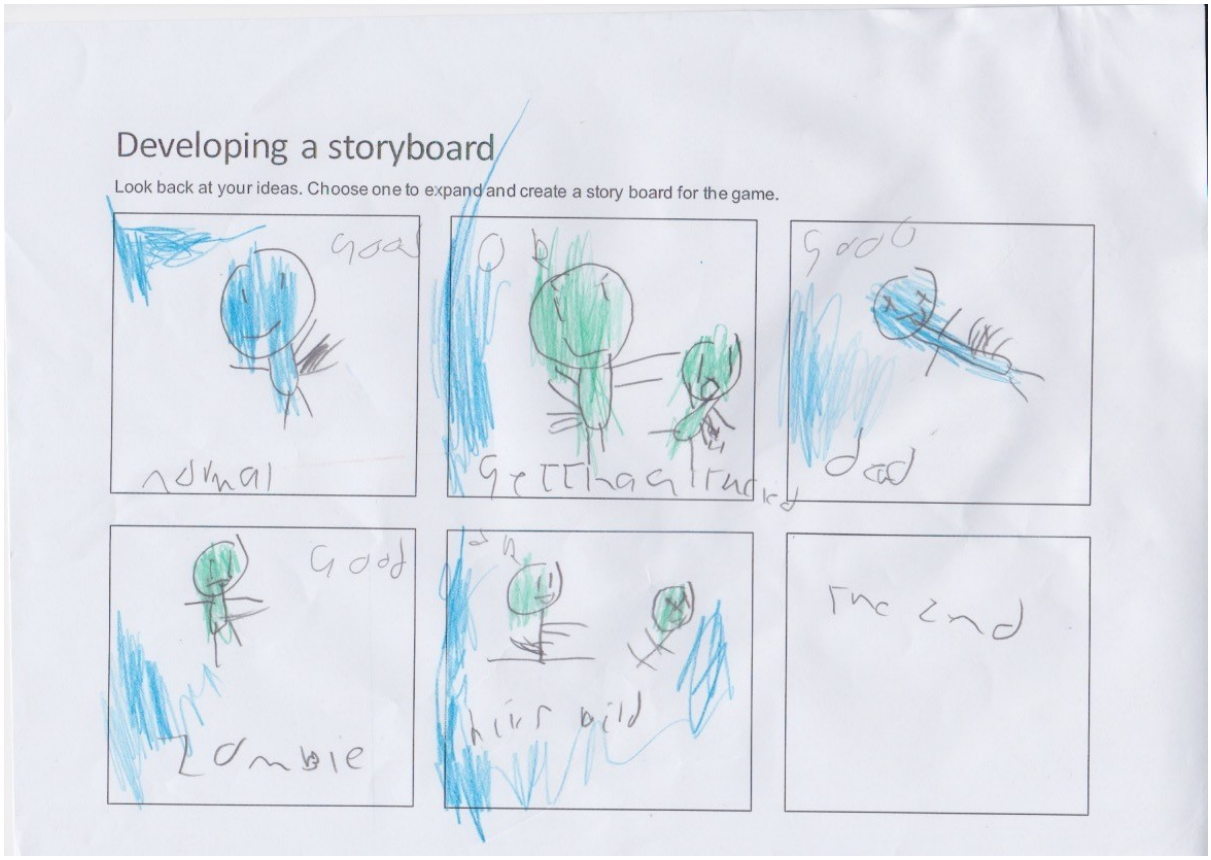


Figure D-12: Storyboard developed by Connor based on feedback from the session with our guest

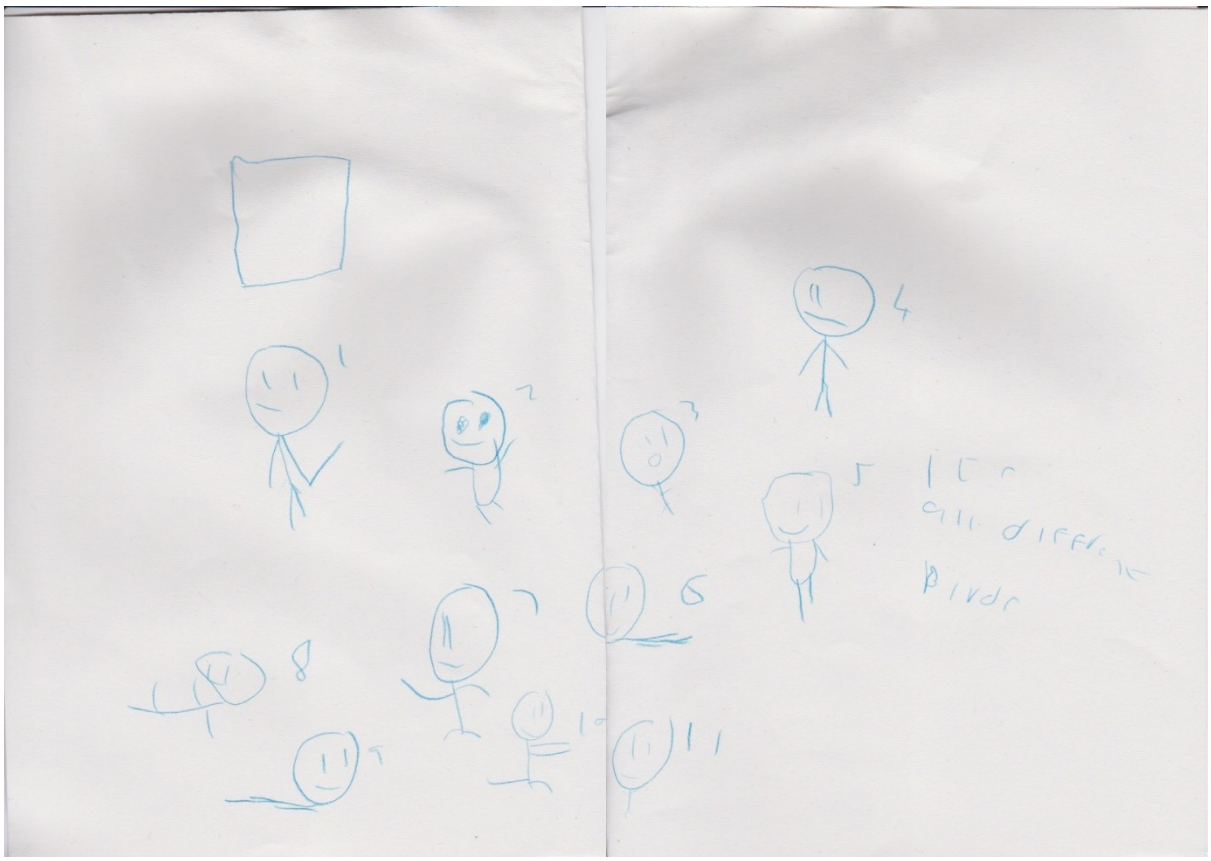


Figure D-13: Development of storyboard by Connor

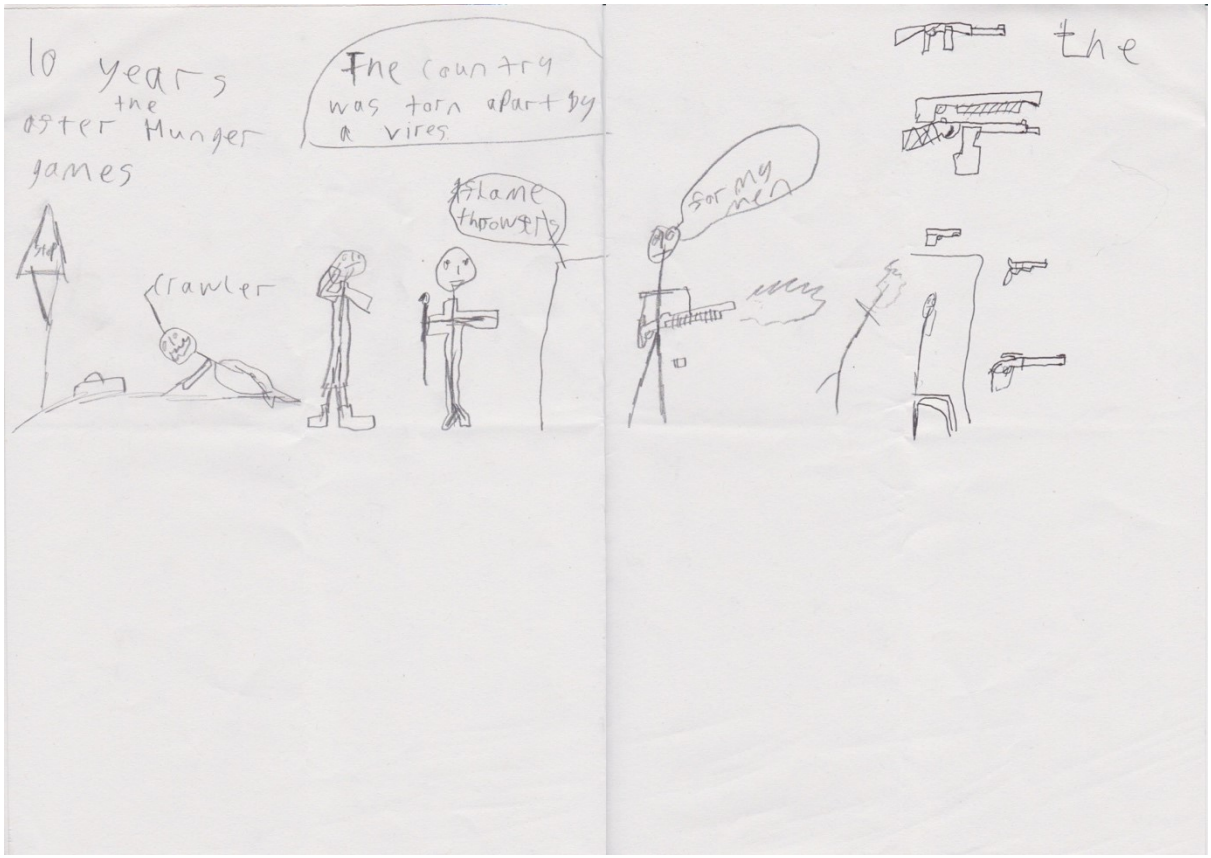


Figure D-14: Storyboard development by Russel following feedback from our guest

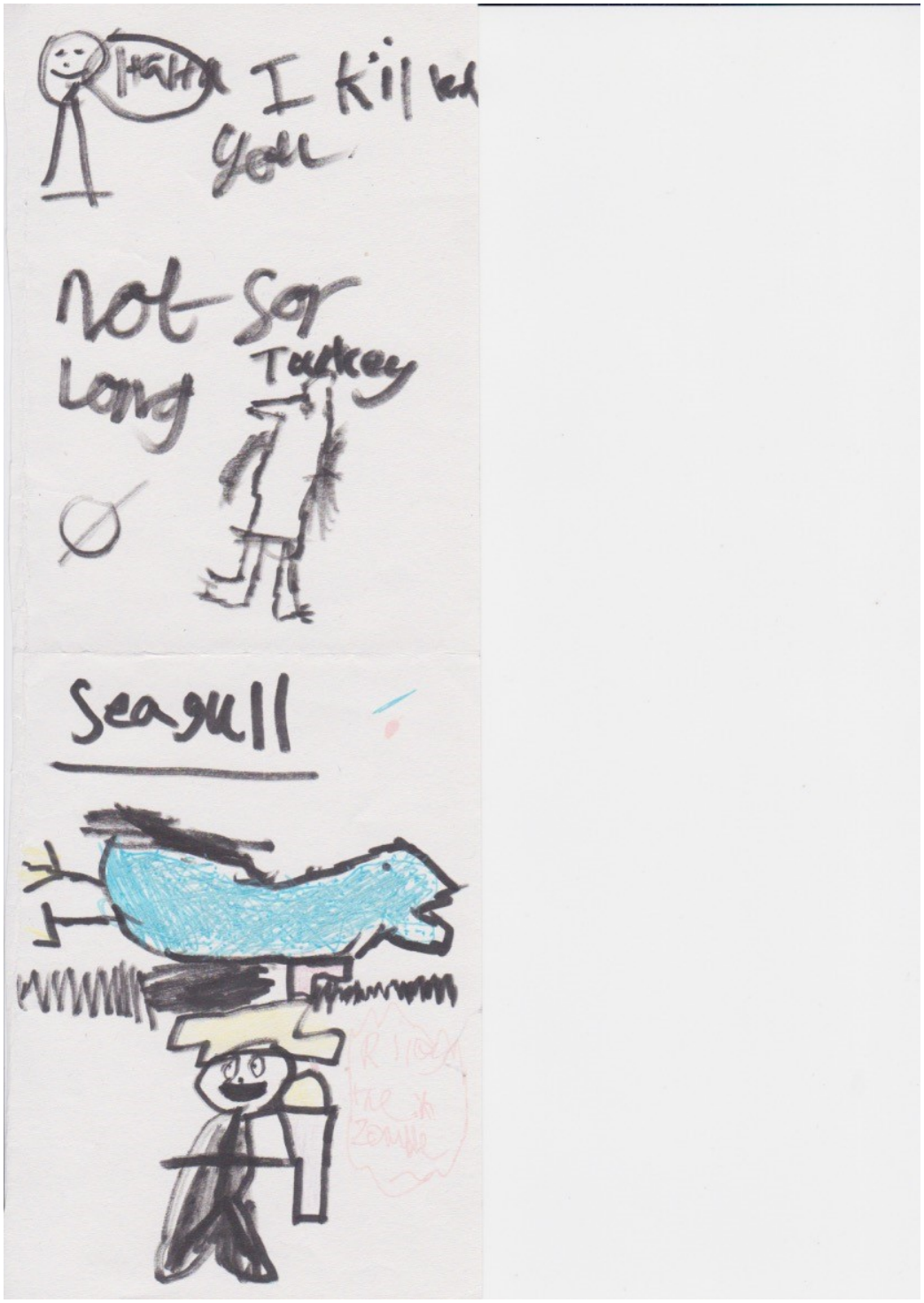


Figure D-15: Storyboard development by Tim following feedback from our guest

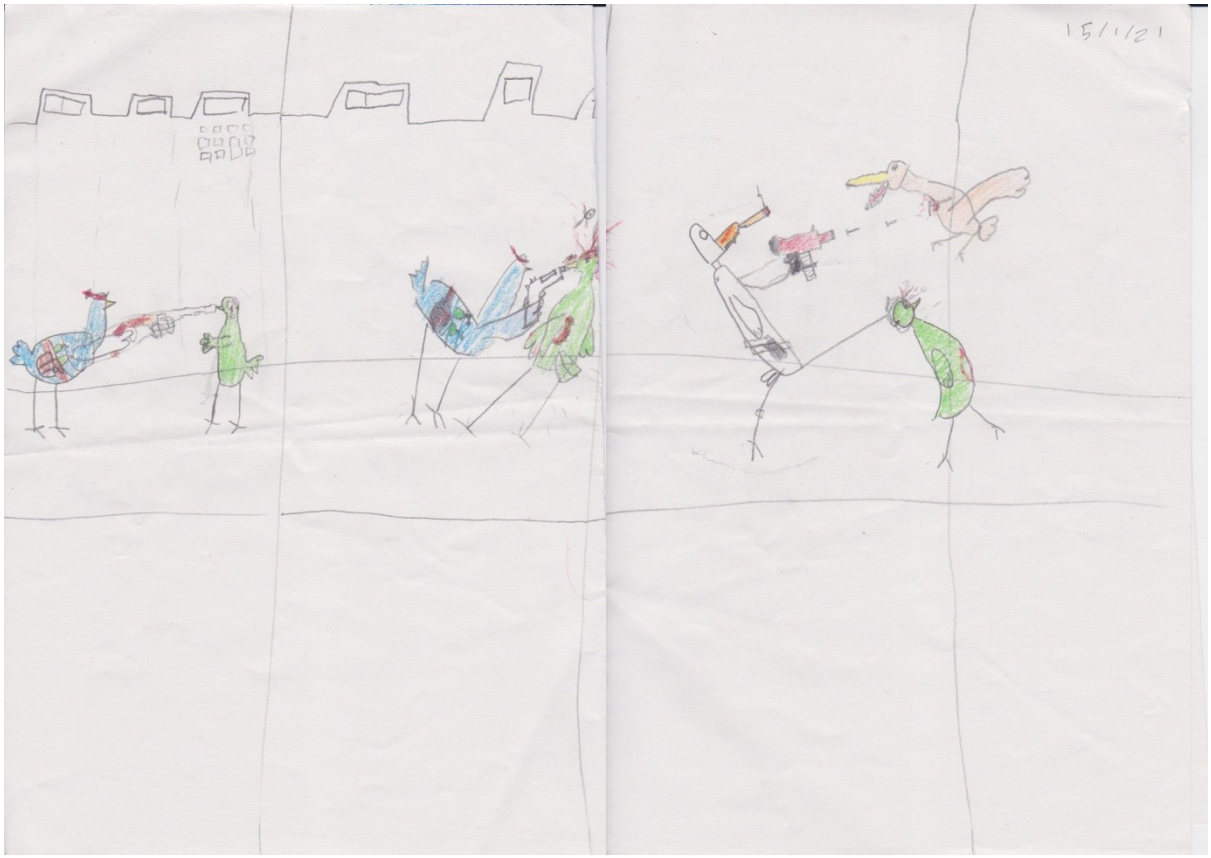


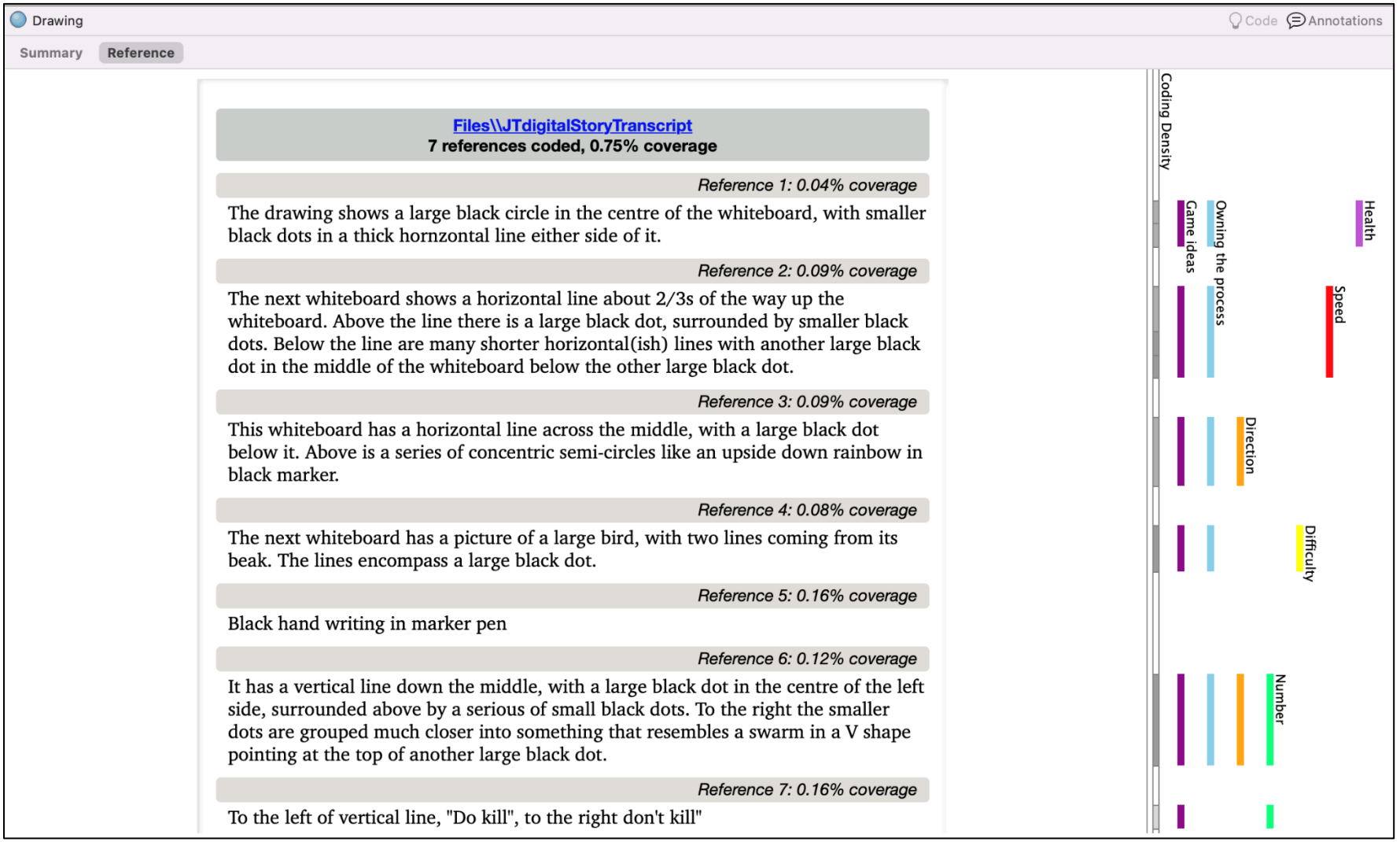
Figure D-16: Development of the storyboard by Kobi following feedback from our guest

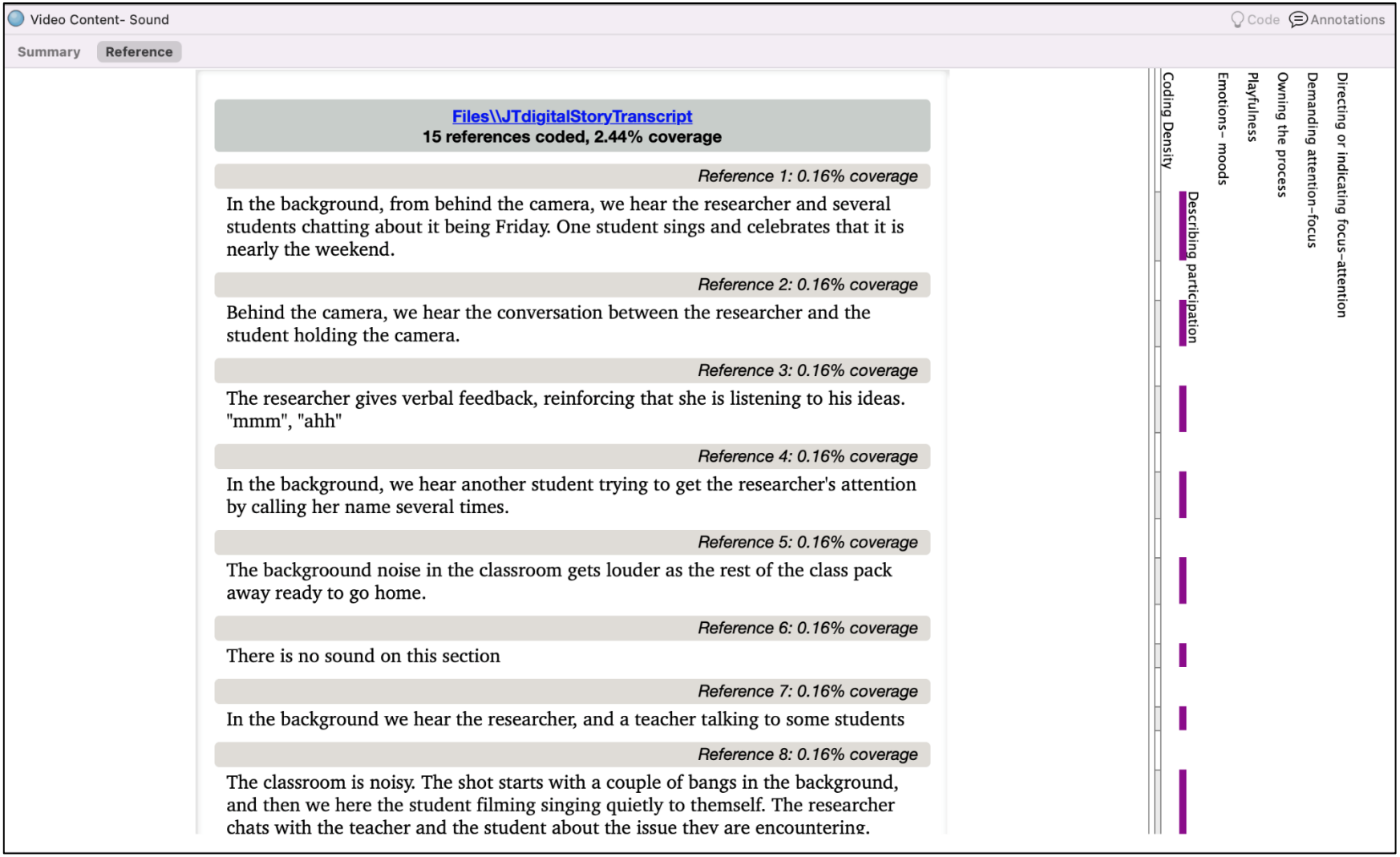
This week I was struck by the humour of the students, as they joked with Fred about his game, and also laughed with each other during the session. This session the students drew extensively on their knowledge of other games, drawing together ideas from other games as they expanded their ideas for their own game.

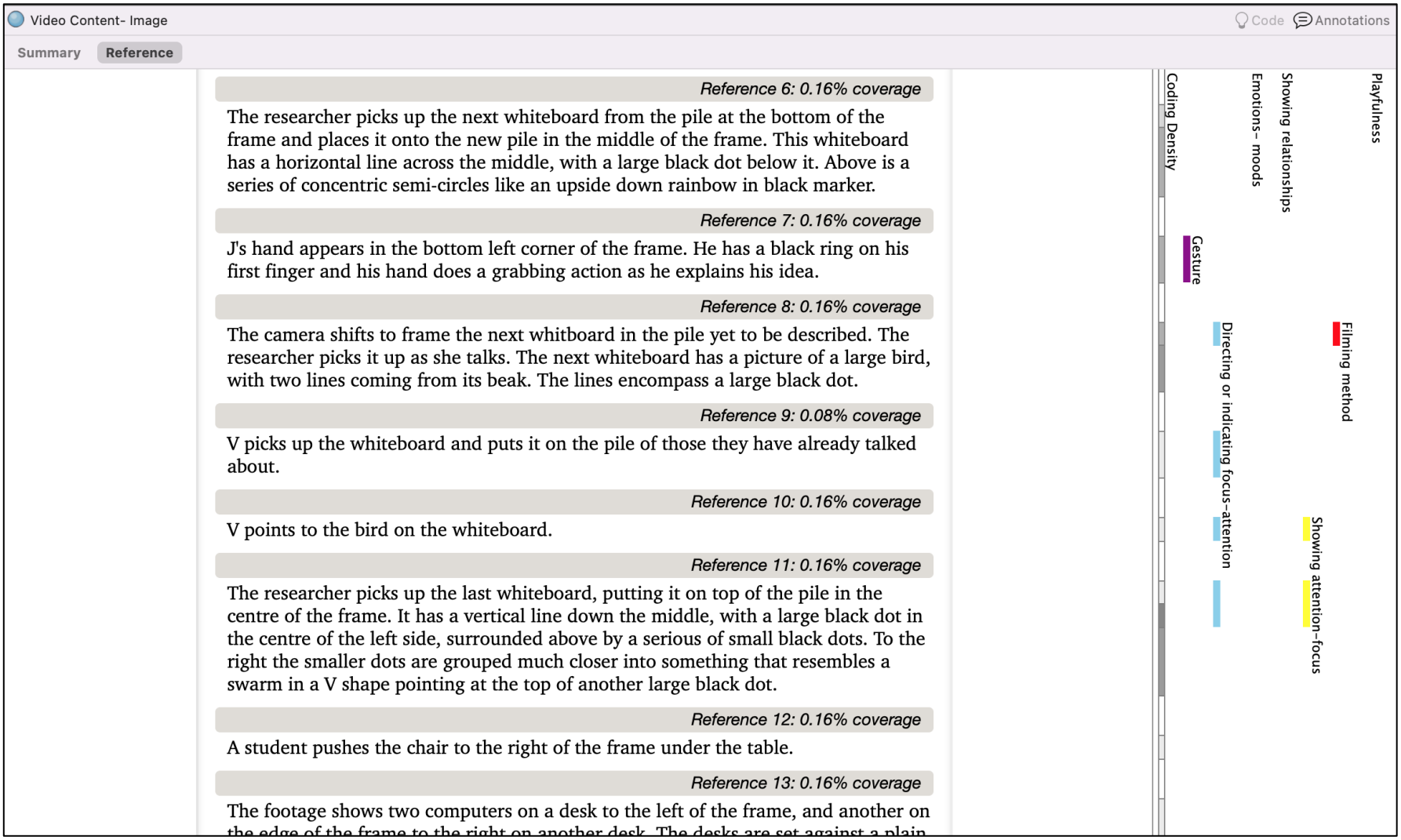
I was particularly conscious of my role as "chair" of the session, as I negotiate whose turn it is to contribute from within the classroom. I was aware some of the more confident students took more "air time" than others, this was particularly noticeable for two students who had been particularly quiet this week.

I also noted that the introductory task asking about favourite games may have shifted their interest away from Fred's job. Next time I should choose an introductory activity more focused on employment, for example, what do you want to be when you grow up?

D.3 Examples of coding meanings and modes from Jay and Terry's digital story




Video Content- Sound
Code
Annotations
Summary
Reference
Files\\JTdigitalStoryTranscript
15 references coded, 2.44% coverage
Reference 1: 0.16% coverage
In the background, from behind the camera, we hear the researcher and several students chatting about it being Friday. One student sings and celebrates that it is nearly the weekend.
Reference 2: 0.16% coverage
Behind the camera, we hear the conversation between the researcher and the student holding the camera.
Reference 3: 0.16% coverage
The researcher gives verbal feedback, reinforcing that she is listening to his ideas. "mmm", "ahh"
Reference 4: 0.16% coverage
In the background, we hear another student trying to get the researcher's attention by calling her name several times.
Reference 5: 0.16% coverage
The backgroound noise in the classroom gets louder as the rest of the class pack away ready to go home.
Reference 6: 0.16% coverage
There is no sound on this section
Reference 7: 0.16% coverage
In the background we hear the researcher, and a teacher talking to some students
Reference 8: 0.16% coverage
The classroom is noisy. The shot starts with a couple of bangs in the background, and then we here the student filming singing quietly to themself. The researcher chats with the teacher and the student about the issue they are encountering.
Coding Density
Describing participation
Emotions- moods
Playfulness
Owning the process
Demanding attention-focus
Directing or indicating focus-attention


Video Content- Image
Code
Annotations
Summary
Reference
Reference 6: 0.16% coverage
The researcher picks up the next whiteboard from the pile at the bottom of the frame and places it onto the new pile in the middle of the frame. This whiteboard has a horizontal line across the middle, with a large black dot below it. Above is a series of concentric semi-circles like an upside down rainbow in black marker.
Reference 7: 0.16% coverage
J's hand appears in the bottom left corner of the frame. He has a black ring on his first finger and his hand does a grabbing action as he explains his idea.
Reference 8: 0.16% coverage
The camera shifts to frame the next whitboard in the pile yet to be described. The researcher picks it up as she talks. The next whiteboard has a picture of a large bird, with two lines coming from its beak. The lines encompass a large black dot.
Reference 9: 0.08% coverage
V picks up the whiteboard and puts it on the pile of those they have already talked about.
Reference 10: 0.16% coverage
V points to the bird on the whiteboard.
Reference 11: 0.16% coverage
The researcher picks up the last whiteboard, putting it on top of the pile in the centre of the frame. It has a vertical line down the middle, with a large black dot in the centre of the left side, surrounded above by a serious of small black dots. To the right the smaller dots are grouped much closer into something that resembles a swarm in a V shape pointing at the top of another large black dot.
Reference 12: 0.16% coverage
A student pushes the chair to the right of the frame under the table.
Reference 13: 0.16% coverage
The footage shows two computers on a desk to the left of the frame, and another on the edge of the frame to the right on another desk. The desks are set against a plain
Coding Density
Emotions- moods
Showing relationships
Playfulness
Gesture
Filming method
Directing or indicating focus-attention
Showing attention-focus

D.4 Cross-referencing modes and meanings in Jay and Terry's digital story

The following table shows the results from cross-referencing the text coded by meanings and modes. The number in each cell denotes the number of times which each mode and meaning overlapped within the digital story, according to the coding completed during the first stage of analysis.

	1 : Colour	2 : Drawing	3 : Filming method	4 : Font	5 : Gesture	6 : Music	7 : Speech	8 : Text	9 : Video Content-	10 : Video Content-	11 : Video Effects-
A : Cultural reference	0	0	0	0	0	0	0	0	0	0	0
B : Action Movies	0	0	0	0	0	0	0	0	0	0	4
C : Cartoons	0	1	0	0	0	0	0	0	1	0	0
D : Computer games	0	1	0	0	0	0	0	0	1	0	0
E : Fairytale films	1	0	0	1	0	0	0	1	0	0	1
F : News coverage	0	0	0	1	0	0	0	1	0	0	4
G : Superhero Movies	0	0	0	0	0	0	0	0	0	0	0
H : Demonstrating expertise	0	0	1	0	26	0	17	0	26	0	0
I : Describing participation	0	0	2	0	0	0	0	4	4	0	0
J : Directing or indicating focus-attention	0	0	0	0	0	0	0	0	0	0	0
K : Changing focus-attention	0	0	7	0	0	0	0	0	8	0	0
L : Demanding attention-focus	0	0	0	0	16	0	3	0	15	0	0
M : Removal of attention-focus	0	0	0	0	2	0	1	0	2	0	0
N : Showing attention-focus	2	0	9	1	21	0	9	0	28	0	0
O : Emotions- moods	0	0	0	0	0	0	0	0	0	0	0
P : Annoyance	0	0	0	0	0	0	4	0	0	0	0

	1 : Colour	2 : Drawing	3 : Filming method	4 : Font	5 : Gesture	6 : Music	7 : Speech	8 : Text	9 : Video Content-	10 : Video Content-	11 : Video Effects-
Q : Comedy	0	0	0	0	0	0	0	0	0	0	2
R : Confusion	0	0	0	0	0	0	2	0	0	0	0
S : Playfulness	4	0	1	4	0	0	0	0	1	0	3
T : Positivity	1	0	0	0	0	2	1	0	0	0	0
U : Game ideas	0	5	1	0	1	0	0	0	6	0	0
V : Difficulty	0	1	0	0	0	0	3	1	1	0	0
W : Direction	0	2	0	0	0	0	1	0	2	0	0
X : Health	0	1	0	0	0	0	1	0	1	0	0
Y : Number	0	2	0	0	0	0	1	1	1	0	0
Z : Speed	0	1	0	0	0	0	1	0	1	0	0
AA : Iconic visual explanation	0	0	1	0	6	0	0	0	5	0	0
AB : Owning the process	0	5	1	0	1	0	0	2	6	0	0
AC : Showing surroundings-environment	0	0	5	0	0	0	0	0	8	0	0
AD : Showing understanding	0	0	0	0	0	0	7	0	0	0	0
AE : Unsure	1	0	1	1	1	0	3	0	0	0	1

Appendix E Ethics documents from study

E.1 Phase one documentation

E.1.1 Phase one information videos

Information videos for students: https://youtu.be/m3rCFoD2HdM

Information videos for parents: https://youtu.be/jCijLQL1bx0

E.1.2 Phase one information sheets for students (simple language)

Student Information Sheet

Researcher: Verity Ward

You are being invited to take part in a research project.

This sheet tells you about it, so you can decide if you want to take part.

You can ask me (Verity) or your teacher if you have any questions.

If you would like to take part, I will ask you to sign a consent form.

What is the research about?

In this project we will make Digital Stories about Fairmead School to help students when they come back to school after the summer holidays. Digital Stories are short videos that show what a place is like from your perspective.

I am a PhD researcher at the University of Southampton. I will write about this as part of my PhD.

Why have you been asked to take part?

Your class has been chosen to take part in the project. Your teacher would like to let you help us make a Digital Story about Fairmead.

What will happen if you agree to take part?

You will take part in activities to help build Digital Stories about Fairmead and its new school building. You will be a co-creator in this project, and the Digital Stories will show your ideas.

As a co-creator, this is your project as well as mine. We will plan and build the Digital Stories together. When we are finished, the Digital Stories will go on the school website, but they will check with you and your parents first. Afterwards we will find out what people thought about the project.

Why might want to take part…

- It should be fun
- Making the Digital Stories might help students moving into the new school building

Why you might not want to take part…

- The Digital Stories will involve filming, and you may be filmed
- Fairmead School would like to put the Digital Stories on the school website when we have finished them

What information will I (Verity) use for my writing?

I will write about the project for my PhD report, and I may also write about it in journals.

I will use the worksheets we use each session, and the Digital Stories you create as evidence of the project. I may show your videos when I talk to other people about the project.

I will not use your real names, the forms with your real names will be kept safe so no one else will know them. I will use fake names to refer to you when I write and tell other people about the project.

Will anyone else know you took part?

People at school will know you have taken part. If you are in the Digital Stories, people who watch them may know you have taken part.

Do you have to take part?

No, you do not have to take part. If you do want to take part, you will need to sign a form to show you want to. If you don't want to take part, you need to tell us, and we will arrange other activities for you to do.

What happens if you change your mind?

You can change your mind about taking part at any time. You can tell me, or your teacher if you change your mind about taking part.

If you change your mind, you will do other activities, and we will make sure you do not appear in the Digital Stories. I will not mention you when I write about the research.

Where can you find out more?

You can talk to me, or your teacher about the study. We can answer any questions you have about taking part.

What happens if there is a problem?

If you are worried about anything related to the project, you should speak to me or your teacher.

Thank you.

Verity Ward

E.1.3 Phase one consent forms for students (simple language)

Student Consent Form

Researcher: Verity Ward

Please tick the boxes if you agree with the sentences. If you have any questions, or you do not want to take part please talk to Verity or your teacher.

	Tick here ↓
Verity has told me about the project, and what it involves.	
I have asked any questions I might have about the project.	
I understand what we will be making Digital Stories, and want to help make them.	
I understand that Verity will use some of the work we do when she writes about the project.	
I understand that Verity will not use my real name when she writes about the project.	
I understand that I do not have to take part.	
I understand that taking part involves video recording, and that these videos might go on the school website.	
I understand that Verity may show these videos when she tells other people about the project.	

Your name……

Your age……

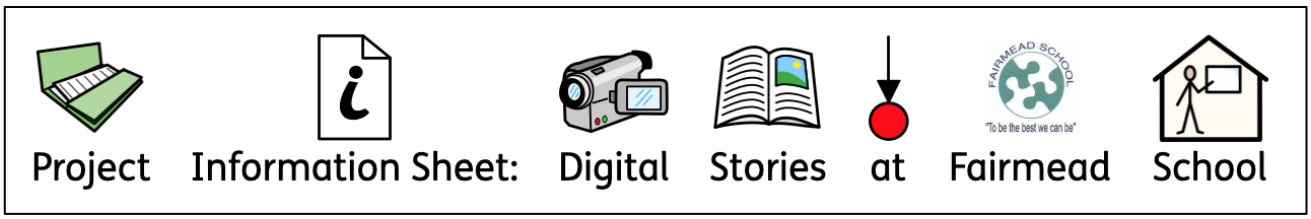
Date……

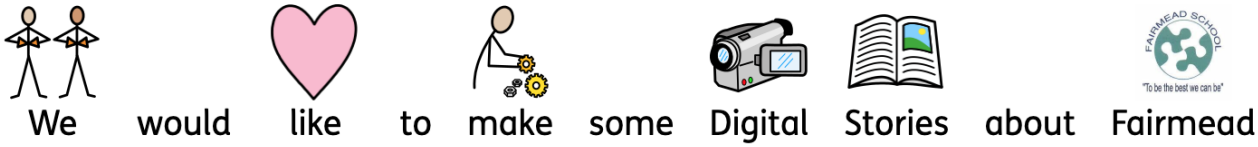
Name of researcher (print name): Verity Ward

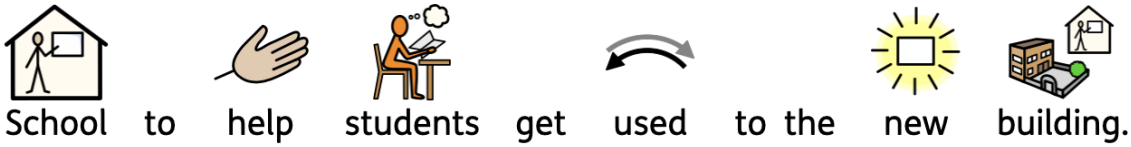
Signature of researcher:

Date……

E.1.4 Phase one information sheets for students (Widget Symbols)



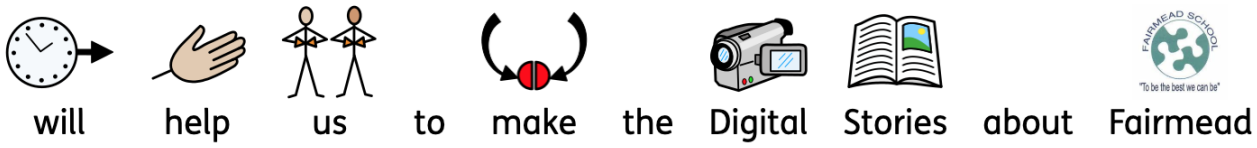

We would like to make some Digital Stories about Fairmead


School to help students get used to the new building.

Digital Stories are short videos about people, places and

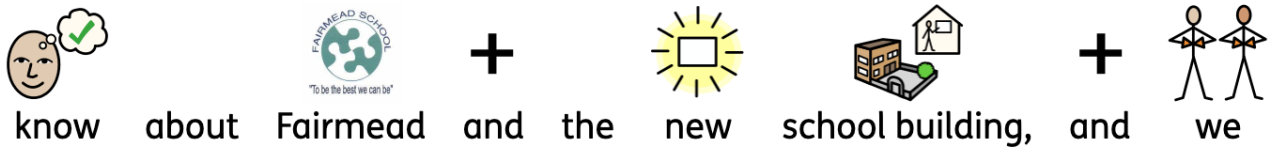
activities.

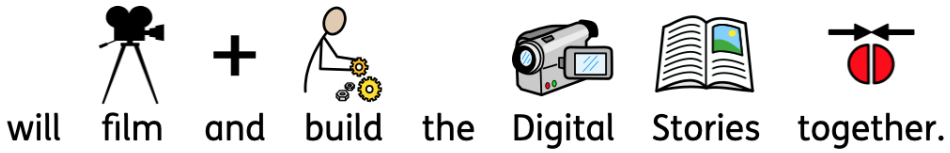
If you take part you will be a co-creator and you


will help us to make the Digital Stories about Fairmead

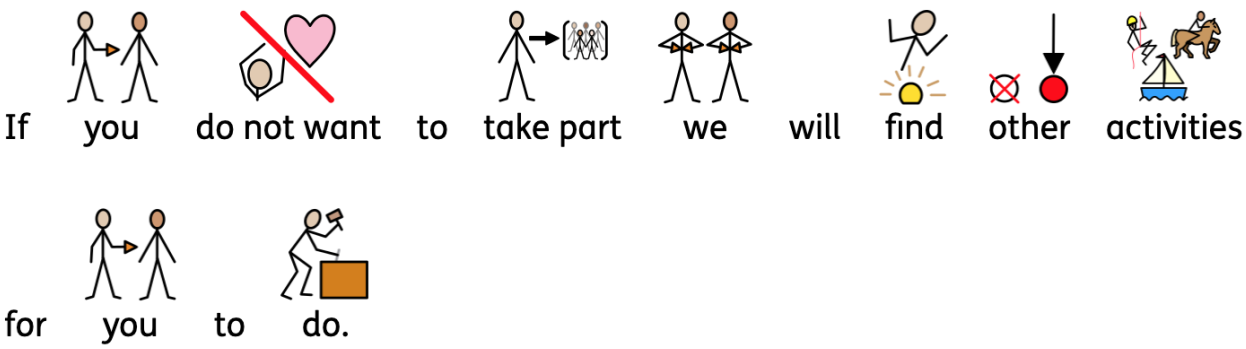
School.

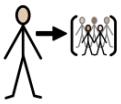
You will help us think about what students want to


know about Fairmead and the new school building, and we

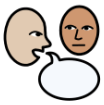

will film and build the Digital Stories together.

When we are finished, the stories will go on the
school website.

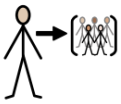
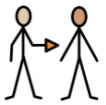
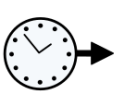

If you do not want to take part we will find other activities
for you to do.



You can change your mind about taking part at any time, you just

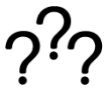


need to tell Verity or your teacher.

If you want to take part, you will need to fill out a

form.



Do you have any questions about the project?

E.1.5 Phase one consent form for students (Widget Symbols)

I know the Digital Stories may go on the school website.	
I understand Verity will write about the project, but that she will not use my real name.	
I know I do not have to take part + I can stop at any time.	

Name: .....

Age: .....

Date: ……

E.1.6 Phase one information sheets for parents

Project Information for Parents: Digital Stories for a New School Building

Researcher: Verity Ward

Your child is being invited to take part in a research study.

This document provides information about the project.

You can contact Verity, the researcher, or Mr Crump at Fairmead School if you have any questions.

If you are happy for your son/daughter to take part you will be asked to sign a consent form.

What is the research about?

This is a collaborative project between me, Verity Ward, and Fairmead School. We want to find out whether Digital Stories can support children and young people in their transition to a new school or school building. Digital Stories are short videos that show what a place is like based on child-led interests and concerns.

This research follows on from a successful Digital Stories project which you can find out more about here: https://autismtransitions.org/.

I am a PhD researcher at the University of Southampton Education School, I work in the ACoRNS research group. This study will form part of my PhD, which is funded by ESRC.

Agreeing to let your child take part in the study does not commit you to taking part in any way.

Why has my child been asked to take part?

Your child's class has been selected to take part in the project. Their teacher would like to give them the opportunity to contribute their ideas to the Digital Story about Fairmead School.

If you do not want your child to take part, we will arrange other activities to do while the rest of the class takes part in the project.

What will happen if I agree to let them take part?

The project will be introduced to your child via a video, and short written summary. I will be there so they can ask any questions. If they also agree to take part, they will sign a form to show they want to let me know.

The sessions will take place during lesson time. Together we will think about what students might want to know about Fairmead and the new school building. We will then do some filming and edit it all together to create Digital Stories about the school.

The school will make the Digital

Stories available to watch via the school website. **If your child is featured in the Digital Stories, the school will contact you to check you consent to this before it is made public**.

At the end of the project, we will find out what students thought of the project. If you agree, you may be contacted to be involved in these evaluations.

If in-person sessions are not possible, then we will hold sessions online using Google Classroom.

Are there any benefits for my child in taking part?

There may be no direct benefits to you or your child, though we hope that taking part will develop an understanding how Digital Stories can be used to support children in their transitions to new schools or placements. You may find it beneficial to see the Story that your child helps to produce, and other children and families may find the Digital Stories helpful.

Are there any risks involved?

All sessions will follow school and government policy regarding COVID-19 risks. The project does not increase their risk beyond normal school activities.

What information will be collected?

I will collect the following information on the consent forms:

- Your child's name and age
- Your name and contact information

This information will be kept confidential. It will not be passed onto other people.

During the project I will also collect the following information for my own analysis:

- any completed worksheets or resources used during the project
- the Digital Stories created by the students
- any data from our evaluations

I may show the videos at presentations about the project to other schools and researchers.

Will anyone else know they have taken part?

These are the people who will know your son/daughter has taken part:

- Other students and staff at Fairmead School
- Verity (PhD researcher) at the University of Southampton

No-one else will know they have taken part in the project, unless they are featured in the final Digital Stories. If you do not wish for your child to be featured in the videos on the school website, we will remove or blur any footage they appear in so they cannot be recognised.

The school will be named in any reports about the research.

The information I collect about your child will be kept strictly confidential. Your child's name will never be used in reports on the project; I will always refer to them by their pseudonym.

Managers at the University of Southampton may ask to see the information we collect to make sure the researchers are keeping it safe.

All information will be stored securely on password-protected computers.

Does my child have to take part?

No. This is their decision as well as yours and we don't mind either way. If they decide to take part, and you are happy for them to take part, we will ask you (and them) to sign a consent form. We must receive your consent form by **Tuesday 8th June**. You may return a paper or electronic copy of your completed consent form. If returning an electronic copy, please email it to v.c.s.ward@soton.ac.uk or you can use the University of Southampton's Safe Send Service.

What happens if I change my mind?

You can change your mind at any time before the end of the study without giving a reason. Please just let me (Verity), or Mr Crump know.

If you do change your mind we will make sure your child does not feature in the final Digital Stories. However, once these have been made, it will not be possible to remove them from the videos.

Given how much the children will work together on the project, I may not be able to remove your child's other contributions.

What will happen to the results of the research?

The results of the research will be written up into a report as part of my PhD. The results may also be published in academic journals.

I am required by ESRC, who have funded my research, to upload anonymised data to a national database. It will only be accessible to researchers from UK higher education institutions and will not be available to the general public. Researchers will be required to gain ethical approval from their own institutions before they use the data.

Where can I get more information?

Please ask Mr Crump if you have any questions about the project: [email redacted]

You can also contact me (Verity) at the University:

v.c.s.ward@soton.ac.uk

What happens if there is a problem?

If you have a concerns about the project, please speak to Verity or Mr Crump first.

If you are still unhappy or have a complaint, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Data Protection Privacy Notice

By law, the University of Southampton has to protect and use the information collected in this project in specific ways. This can sound very formal and complicated.

The main thing to know is that we treat any information very carefully. There is detailed information about this that we have to let you know, and this can be found below.

Thank you for taking the time to read this.

Verity Ward

More details about Data Protection and Privacy that we have to tell you

- The University of Southampton carries out research with the greatest care and consideration.
- We have to have a good reason ('lawful basis') for asking for your personal information.
- The good reason is that we are doing research that we think other people might be interested in, and could help them.
- This means that when you agree to take part in a research study, we will only use information (data) about you in the ways that you have been told about in this project information sheet.
- We will not use your information for any other purpose.
- The University's policy about how we use information about you can be found on its website here: https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page and there is more information about keeping your details private here: https://www.mrc.soton.ac.uk/web2/files/2013/04/privacy.pdf.
- Please ask the research team if you have any questions or are unclear what information is being collected about you.
- The University of Southampton is the 'Data Controller' for this study, which means that we are responsible for looking after your information and using it properly.
- The University of Southampton will keep information about you for 10 years after the study has finished. After this, any link between you and your information will be removed.
- If you have any questions about how your information (data) is used you can find more information here: [https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page]
- If you need more help or information, please contact the University's Data Protection Officer by email: data.protection@soton.ac.uk.

E.1.7 Phase one consent forms for parents

CONSENT FORM for parents / carers

Study title: Digital Stories for a new school building

Researcher name: Verity Ward

ERGO number: 64893

Please initial the box(es) if you agree with the statement(s):

	Your initials go here ↓
I have read and understood the information sheet dated 14/5/21 (v1.0) and have had the opportunity to ask questions about the project.	
I understand that taking part in the study may involve my child taking part in video recording of themselves and school buildings and spaces.	
I understand that other people will see these videos as they will be put on Fairmead School website, and may be shown and referenced in reports and presentations about the project.	
I understand that Verity is required to upload the anonymised data to a national database, but that it will only be accessible to other researchers.	
I understand their participation is voluntary and I may withdraw them at any time before the end of the study for any reason without their rights being affected.	
I understand that if I withdraw them from the study that it may not be possible to remove their contributions once their personal information is no longer linked to it.	
I understand that they will not be directly identified in any reports of the research.	

I understand that my personal information collected about me such as my name or where I live will not be shared beyond the project team.	
I agree to let my child take part in this project and for information about them and their contributions to be used in the study.	

Optional - please only initial the box(es) you wish to agree to:

I agree to be contacted about involvement in the evaluation of the project.	

Name of your child (print name0).....

Age of your child.....

Your name (print name).....

Contact number/email address .....

.....

Signature.....

Date.....

Name of researcher (print name) Verity Ward.....

Signature of researcher.....

Date.....

E.1.8 Phase one information sheets for staff

Project Information for Fairmead School Staff: Digital Stories for a New School Building

Researcher: Verity Ward

You are being invited to take part in a research study.

This document provides information about the project.

You can contact Verity, the researcher, or Mr Crump if you have any questions.

If you are happy to take part you will be asked to sign a consent form.

What is the research about?

This is a collaborative project between me, Verity Ward, and Fairmead School. We want to find out whether Digital Stories can support children and young people in their transition to a new school or school building. Digital Stories are short videos that show what a place is like based on child-led interests and concerns.

This research follows on from a successful Digital Stories project which you can find out more about here: https://autismtransitions.org/.

I am a PhD researcher at the University of Southampton Education School, I work in the ACoRNS research group. This study will form part of my PhD, which is funded by ESRC.

You may be invited to give feedback later on in the project. However, agreeing to take part in this part of the research does not commit you to taking part in any other way.

Why have I been asked to take part?

You are a member of staff who regularly supports one of the classes which has been chosen to take part in this research. This study will take place during lesson time.

While it is primarily intended to be a learning experience for the students, I hope that you will learn some things during this research as well.

What will happen if I agree to take part?

You will continue to support the students, as you normally do. The sessions will take place during lesson time. Together with the students, we will think about what students might want to know about Fairmead and the new school building. We will then do some filming and edit it all together to create Digital Stories about the school.

The school will make the Digital Stories available to watch via the school website. **If you are featured**

in the Digital Stories, the school will contact you to check you consent before it is made public.

At the end of the project, the students and I will work together to find out what students thought of the project. If you agree, you may be contacted to be involved in these evaluations.

If in-person sessions are not possible, then we will hold sessions online using Google Classroom.

Are there any benefits to taking part?

There may be no direct benefits to you or personally, though we hope that taking part will develop an understanding how Digital Stories can be used to support children in their transitions to new schools or placements. Students and their families may find the Digital Stories helpful.

Are there any risks involved?

All sessions will follow school and government policy regarding COVID-19 risks. The project does not increase my risk beyond normal school activities.

What information will be collected?

I will collect the following information on the consent forms:

- Your name and contact information

This information will be kept confidential. It will not be passed onto other people.

During the project I will also collect the following information for my own analysis:

- any completed worksheets or resources used during the project
- the Digital Stories created by the students
- any data from our evaluations

I may show the videos at presentations about the project to other schools and researchers.

Will anyone else know I have taken part?

These are the people who will know you have taken part:

- Other students and staff at Fairmead School
- Verity (PhD researcher) at the University of Southampton

No-one else will know you have taken part in the project, unless you are featured in the final Digital Stories. If you do not wish to be featured in the videos on the school website, we will remove or blur any footage you appear in so you cannot be recognised.

The school will be named in any reports about the research.

The information I collect about you will be kept strictly confidential. Your name will never be used in reports on the project; I will always refer to you by your pseudonym or job role (e.g. “teacher” or “TA”).

Managers at the University of Southampton may ask to see the information we collect to make sure the researchers are keeping it safe.

All information will be stored securely on password-protected computers.

Do I have to take part?

No. This is your decision and I don’t mind either way. If you decide to take part, I will ask you to sign a consent form.

What happens if I change my mind?

You can change your mind at any time before the end of the study without giving a reason. Please just let me (Verity), or Mr Crump know.

If you do change your mind we will make sure you do not feature in the students’ Digital Stories, and try to arrange that you support another group during these sessions. However, once the Digital Stories have been made, it will not be possible to remove you from the videos.

Given the collaborative nature of the project, I may not be able to remove your other contributions.

What will happen to the results of the research?

The results of the research will be written up into a report as part of my PhD. The results may also be published in academic journals.

I am required by ESRC, who have funded my research, to upload anonymised data to a national

database. It will only be accessible to researchers from UK higher education institutions and will not be available to the general public. Researchers will be required to gain ethical approval from their own institutions before they use the data.

Where can I get more information?

Please ask Mr Crump if you have any questions about the project: [email redacted]

You can also contact me (Verity) at the University: v.c.s.ward@soton.ac.uk

What happens if there is a problem?

If you have a concerns about the project, please speak to Verity or Mr Crump first.

If you are still unhappy or have a complaint, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Data Protection Privacy Notice

By law, the University of Southampton has to protect and use the information collected in this project in specific ways. This can sound very formal and complicated.

The main thing to know is that we treat any information very carefully. There is detailed information about this that we have to let you know, and this can be found below.

Thank you for taking the time to read this.

Verity Ward

More details about Data Protection and Privacy that we have to tell you

- The University of Southampton carries out research with the greatest care and consideration.
- We have to have a good reason ('lawful basis') for asking for your personal information.
- The good reason is that we are doing research that we think other people might be interested in, and could help them.
- This means that when you agree to take part in a research study, we will only use information (data) about you in the ways that you have been told about in this project information sheet.
- We will not use your information for any other purpose.
- The University's policy about how we use information about you can be found on its website here: https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page and there is more information about keeping your details private here: https://www.mrc.soton.ac.uk/web2/files/2013/04/privacy.pdf.
- Please ask the research team if you have any questions or are unclear what information is being collected about you.
- The University of Southampton is the 'Data Controller' for this study, which means that we are responsible for looking after your information and using it properly.
- The University of Southampton will keep information about you for 10 years after the study has finished. After this, any link between you and your information will be removed.
- If you have any questions about how your information (data) is used you can find more information here: [https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page]
- If you need more help or information, please contact the University's Data Protection Officer by email: data.protection@soton.ac.uk.

E.1.9 Phase one consent forms for staff

STAFF CONSENT FORM

Study title: Digital Stories for a new school building

Researcher name: Verity Ward

ERGO number: 64893

Please initial the box(es) if you agree with the statement(s):

	Your initials go here ↓
I have read and understood the information sheet v1.0 14/05/21 and have had the opportunity to ask questions about the study.	
I agree to take part in this research project and agree for information about me and my contributions to be used in the study.	
I understand my participation is voluntary and I may withdraw at any time before the end of the study for any reason.	
I understand that if I withdraw from the study that it may not be possible to remove my contributions to collaborative activities.	
I understand that I will not be directly identified in any reports of the research.	
I understand that taking part in the study involves video recording. The students will then create Digital Stories which I may feature in.	
I understand that the school intends to make the Digital Stories available on their website, but that they will not be made publicly available without my permission if I feature in them.	
I understand that Verity is required to upload the anonymised data to a national database, but that it will only be accessible to other researchers.	
I understand that personal information collected about me will not be shared beyond the study team.	

I understand that I may be asked to give feedback at the end of the project, but that taking part now does not commit me to doing so.	

Your name (print name)_____.

Contact number/email address _____.

_____.

Signature_____.

Date_____.

Name of researcher (print name) Verity Ward_____.

Signature of researcher_____.

Date_____.

E.2 Phase two documentation

E.2.1 Phase two information sheet for students

Student Information Sheet - Evaluation

Researcher: Verity Ward

You are being invited to take part in a research project.

This sheet tells you about it, so you can decide if you want to take part.

You can ask me (Verity) or your teacher if you have any questions.

If you would like to take part, I will ask you to sign a consent form.

What is the research about?

In this project we will give feedback on Digital Stories about Fairmead School. Digital Stories are short videos that show what a place is like from students' perspective.

I am a PhD researcher at the University of Southampton. I will write about this as part of my PhD.

Why have you been asked to take part?

Your class has been chosen to take part in the project. Your teacher would like to let you tell us about what you think of the Digital Stories about Fairmead.

What will happen if you agree to take part?

You will take part in activities to help give feedback on the Digital Stories about Fairmead and its new school building. You will be a co-creator in this project, and we want to know what you think about them.

As a co-creator, this is your project as well as mine. Together we will find out what people thought about the project, through activities where you tell us what you think about the Digital Stories.

Why might want to take part…

- It should be fun

- Knowing about what you think means we can improve the Digital Stories or make more if we need to

Why you might not want to take part…

- Verity may want to show what you do with her to other people

What information will I (Verity) use for my writing?

I will write about the project for my PhD report, and I may also write about it in journals.

I will use the worksheets we use each session, and anything you create as evidence of the project. I may show your videos, if you make any, when I talk to other people about the project.

I will not use your real names, the forms with your real names will be kept safe so no one else will know them. I will use fake names to refer to you when I write and tell other people about the project.

Will anyone else know you took part?

People at school will know you have taken part.

Do you have to take part?

No, you do not have to take part. If you do want to take part, you will need to sign a form to show you want to. If you don't want to take part, you need to tell us, and we will arrange other activities for you to do.

What happens if you change your mind?

You can change your mind about taking part at any time. You can tell me, or your teacher if you change your mind about taking part.

If you change your mind, you will do other activities, and we will make sure you do not appear in the Digital Stories. I will not mention you when I write about the research.

Where can you find out more?

You can talk to me, or your teacher about the study. We can answer any questions you have about taking part.

What happens if there is a problem?

If you are worried about anything related to the project, you should speak to me or your teacher.

Thank you.

Verity Ward

E.2.2 Phase two consent forms for students

Student Consent Form- Evaluation

Researcher: Verity Ward

Please tick the boxes if you agree with the sentences. If you have any questions, or you do not want to take part please talk to Verity or your teacher.

	Tick here ↓
Verity has told me about the project, and what it involves.	
I have asked any questions I might have about the project.	
I understand we will be evaluating the Digital Stories, and want to help do this.	
I understand that Verity will use some of the work we do when she writes about the project.	
I understand that Verity will not use my real name when she writes about the project.	
I understand that I do not have to take part.	
I understand that taking part may involve video recording.	
I understand that Verity may show these videos when she tells other people about the project.	

Your name…….

Your age…….

Date…….

Name of researcher (print name): Verity Ward

Signature of researcher:

Date……

E.2.3 Phase two information update for parents

Additional Evaluation Information for Parents: Digital Stories for a New School Building

Researcher: Verity Ward

Your child is taking part in a research study. This document provides **additional information** about the evaluation for project.

If we do not hear from you, your child will continue to be included in the research.

You can contact Verity, the researcher, or Mr Crump at Fairmead School if you have any questions.

If you are not happy for your son/daughter to take part you will need to contact

What is the evaluation about?

This evaluation is about the project to develop Digital Stories about Fairmead School. Digital Stories are short videos that show what a place is like based on child-led interests and concerns.

You have already agreed for your child to take part in the project, but we would like to provide some more information about the project evaluation.

The research is a collaborative project between me, Verity Ward, and Fairmead School. We want to find out about students' experiences of making and using the Digital Stories to support children and young people in their transition to a new school or school building.

Why has my child been asked to help with the evaluation?

Your child has already had the opportunity to contribute their ideas to the Digital Stories about Fairmead School. This evaluation will look at their experiences of the Digital Stories.

If you do not want your child to take part in the evaluation, we will arrange other activities to do while the rest of the class does the evaluation.

What will happen if I agree to let them take part?

The sessions will take place during lesson time. Together we will find out what students thought of the project by completing feedback activities about the Digital Stories. These activities will help explore students' experiences of making and using the Digital Stories. They will tell us what they liked, and didn't like about making the Digital Stories, and what they would do differently if they made them again. Students will have the option to complete activities in a way that suits them, they may choose to use pictures, writing, photos or videos.

We may also conduct interviews about the feedback activities to deepen our understanding of their experiences. These interviews may be recorded.

If in-person sessions are not possible, then we will hold sessions online using Google Classroom.

What additional information will be collected?

During the evaluation I will collect the following information for my own analysis:

- any completed worksheets or resources used during the project, this may include your child's pictures, writing or footage
- audio recordings from interviews about the feedback activities

I may show evaluation data at presentations about the project to other schools and researchers.

Does my child have to take part?

No. This is their decision as well as yours and we don't mind either way.

If you are not happy for them to take part, you must let us know by 24/11/21. You can contact us by email v.c.s.ward@soton.ac.uk or [email redacted] or by phoning the school (01935 421295).

What happens if I change my mind?

You can change your mind at any time before the end of the study without giving a reason. Please just let me (Verity), or Mr Crump know.

If you do change your mind we will try to remove their data from the analysis, However, given how much the children will work together on the project, I may not be able to remove your child's other contributions.

What happens if there is a problem?

If you have a concerns about the project, please speak to Verity or Mr Crump first.

If you are still unhappy or have a complaint, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Thank you for taking the time to read this.

Verity Ward

E.2.4 Phase two information sheet for parents

Evaluation Information for Parents: Digital Stories for a New School Building

Researcher: Verity Ward

Your child is being invited to take part in a research study.

This document provides information about the project.

You can contact Verity, the researcher, or Mr Crump at Fairmead School if you have any questions.

If you are happy for your son/daughter to take part you will be asked to sign a consent form.

What is the research about?

This research is about the project to develop Digital Stories about Fairmead School. Digital Stories are short videos that show what a place is like based on child-led interests and concerns. In the first part of the project, students from Fairmead School created some Digital Stories about the school to support the transition into school this September.

This is a collaborative project between me, Verity Ward, and Fairmead School. We want to find out whether Digital Stories can support children and young people in their transition to a new school or school building. Digital Stories are short videos that show what a place is like based on child-led interests and concerns.

I am a PhD researcher at the University of Southampton Education School, I work in the ACoRNS research group. This study will form part of my PhD, which is funded by ESRC.

Agreeing to let your child take part in the study does not commit you to taking

part in any way.

Why has my child been asked to take part?

Your child's class has been selected to take part in the project. Other students in their class have already had the opportunity to contribute to the Digital Stories last year. We would like to give your child the opportunity to contribute their ideas about the Digital Stories to the evaluation.

If you do not want your child to take part, we will arrange other activities to do while the rest of the class takes part in the project.

What will happen if I agree to let them take part?

The project will be introduced to your child via a short written summary. I will be there so they can ask any questions. If they also agree to take part, they will sign a form to show they want to let me know.

The sessions will take place during lesson time. Together we will find out what students thought of the project by completing feedback activities about the Digital Stories. These activities will help explore students' experiences of using the Digital Stories. They will tell us what they liked, and didn't like about making the Digital Stories, and what they would do differently if they made them again. Students will have the option to complete activities in a way that suits them, they may choose to use pictures, writing, photos or videos.

We may also conduct interviews about the feedback activities to deepen our understanding of their experiences. These interviews may be recorded.

If in-person sessions are not possible, then we will hold sessions online using Google Classroom.

Are there any benefits for my child in taking part?

There may be no direct benefits to you or your child, though we hope that taking part will develop an understanding how Digital Stories can be used to support children in their transitions to new schools or placements.

Are there any risks involved?

All sessions will follow school and government policy regarding COVID-19 risks. The project does not increase their risk beyond normal school activities.

What information will be collected?

I will collect the following information on the consent forms:

- Your child's name and age
- Your name and contact information

This information will be kept confidential. It will not be passed onto other people.

During the evaluation I will collect the following information for my own analysis:

- any completed worksheets or resources used during the project, this may include your child's pictures, writing or footage
- audio recordings from interviews about the feedback activities

I may show evaluation data at presentations about the project to other schools and researchers.

Will anyone else know they have taken part?

These are the people who will know your son/daughter has taken part:

- Other students and staff at Fairmead School
- Verity (PhD researcher) at the University of Southampton

The school will be named in any reports about the research.

The information I collect about your child will be kept strictly confidential. Your child's name will never be used in reports on the project; I will always refer to them by their pseudonym.

Managers at the University of Southampton may ask to see the information we collect to make sure the researchers are keeping it safe.

All information will be stored securely on password-protected computers.

Does my child have to take part?

No. This is their decision as well as yours and we don't mind either way. If they decide to take part, and you are happy for them to take part, we will ask you (and them) to sign a consent form. We must receive your consent form by **23/11/2021**. You may return a paper or electronic copy of your completed consent form. If returning an electronic copy, please email it to v.c.s.ward@soton.ac.uk or you can use the University of Southampton's Safe Send Service.

What happens if I change my mind?

You can change your mind at any time before the end of the study without giving a reason. Please just let me (Verity), or Mr Crump know.

If you do change your mind we will try to remove their data from the analysis, However, given how much the children will work together on the project, I may not be able to remove your child's other contributions.

What will happen to the results of the research?

The results of the research will be written up into a report as part of my PhD. The results may also be published in academic journals.

I am required by ESRC, who have funded my research, to upload anonymised data to a national database. It will only be accessible to researchers from UK higher education institutions and will not be available to the general public. Researchers will be required to gain ethical approval from their own institutions before they use the data.

Where can I get more information?

Please ask Mr Crump if you have any questions about the project: [email redacted]

You can also contact me (Verity) at the University: v.c.s.ward@soton.ac.uk

What happens if there is a problem?

If you have a concerns about the project, please speak to Verity or Mr Crump first.

If you are still unhappy or have a complaint, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Data Protection Privacy Notice

By law, the University of Southampton has to protect and use the information collected in this project in specific ways. This can sound very formal and complicated.

The main thing to know is that we treat any information very carefully. There is detailed information about this that we have to let you know, and this can be found below.

Thank you for taking the time to read this.

Verity Ward

More details about Data Protection and Privacy that we have to tell you

- The University of Southampton carries out research with the greatest care and consideration.
- We have to have a good reason ('lawful basis') for asking for your personal information.
- The good reason is that we are doing research that we think other people might be interested in, and could help them.
- This means that when you agree to take part in a research study, we will only use information (data) about you in the ways that you have been told about in this project information sheet.
- We will not use your information for any other purpose.
- The University's policy about how we use information about you can be found on its website here: https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page and there is more information about keeping your details private here: https://www.mrc.soton.ac.uk/web2/files/2013/04/privacy.pdf.
- Please ask the research team if you have any questions or are unclear what information is being collected about you.
- The University of Southampton is the 'Data Controller' for this study, which means that we are responsible for looking after your information and using it properly.
- The University of Southampton will keep information about you for 10 years after the study has finished. After this, any link between you and your information will be removed.
- If you have any questions about how your information (data) is used you can find more information here: [https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page]
- If you need more help or information, please contact the University's Data Protection Officer by email: data.protection@soton.ac.uk.

E.2.5 Phase two consent form for parents

EVALUATION CONSENT FORM for parents / carers

Study title: Digital Stories for a new school building

Researcher name: Verity Ward

ERGO number: 64893

Please initial the box(es) if you agree with the statement(s):

	Your initials go here ↓
I have read and understood the information sheet dated 16/11/21 (v1.0E) and have had the opportunity to ask questions about the project.	
I understand that taking part in the study may involve my child taking part in evaluation activities and video recording of themselves.	
I understand that other people will see these videos and evaluations as they may be shown and referenced in reports and presentations about the project.	
I understand that Verity is required to upload the anonymised data to a national database, but that it will only be accessible to other researchers.	
I understand their participation is voluntary and I may withdraw them at any time before the end of the study for any reason without their rights being affected.	
I understand that if I withdraw them from the study that it may not be possible to remove their contributions once their personal information is no longer linked to it.	
I understand that they will not be directly identified in any reports of the research.	
I understand that my personal information collected about me such as my name or where I live will not be shared beyond the project team.	

I agree to let my child take part in this project evaluation and for information about them and their contributions to be used in the study.	

Name of your child (print name)_____.

Age of your child_____.

Your name (print name)_____.

Contact number/email address _____.

_____.

Signature_____.

Date_____.

Name of researcher (print name) Verity Ward_____.

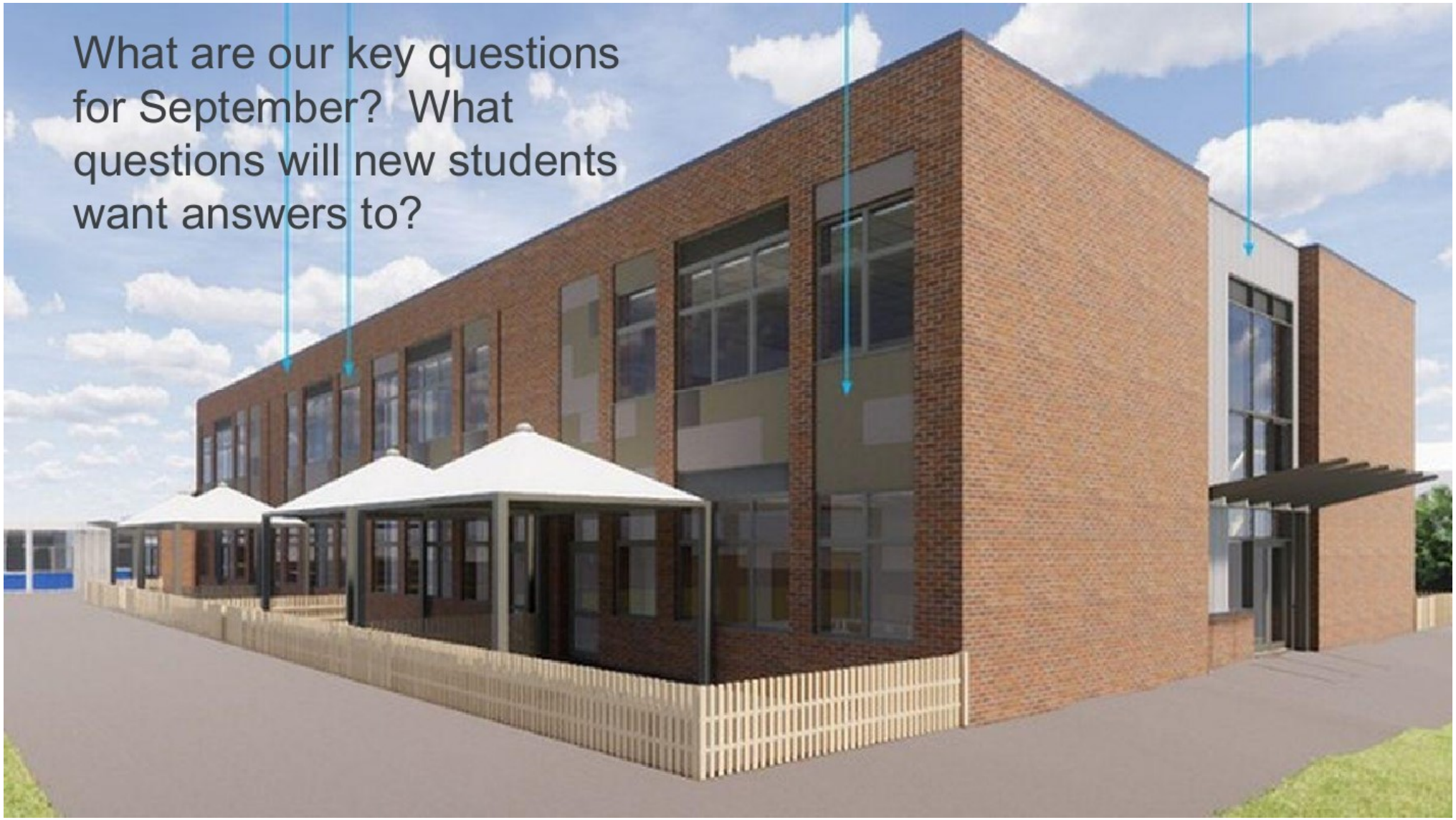
Signature of researcher_____.

Date_____.

Appendix F Worksheets and resources from study two

F.1 Phase one resources

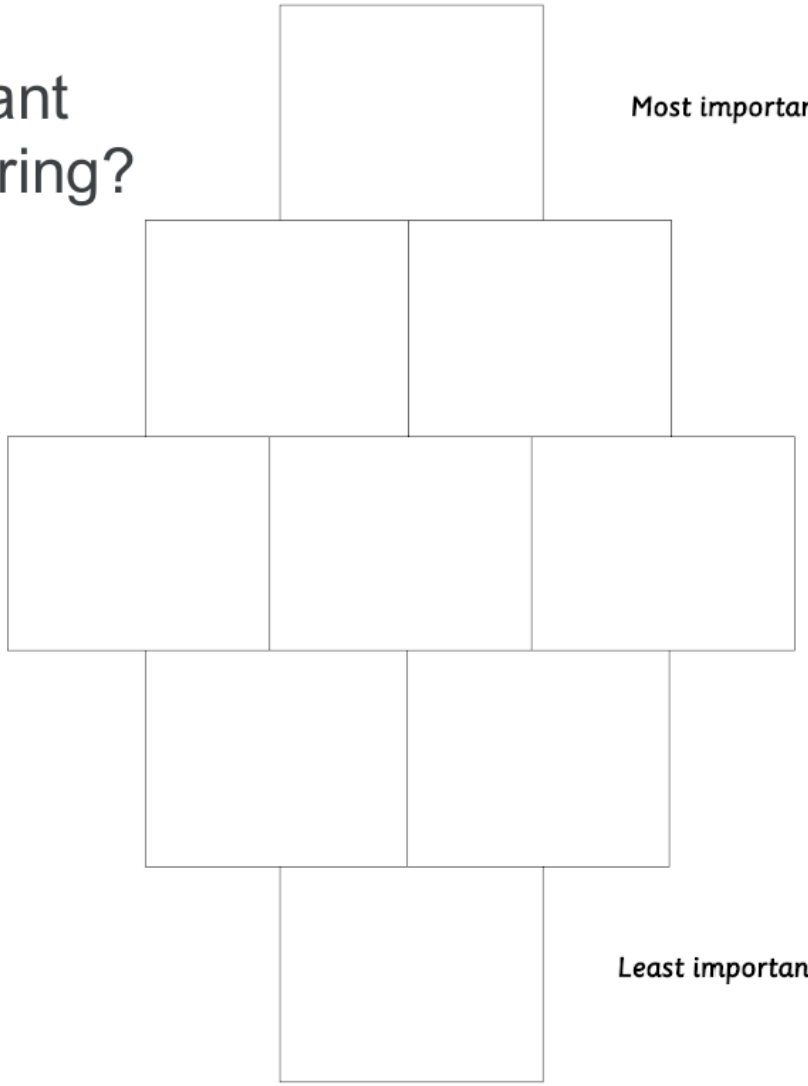
F.1.1 Week 1: planning prompt for generating questions



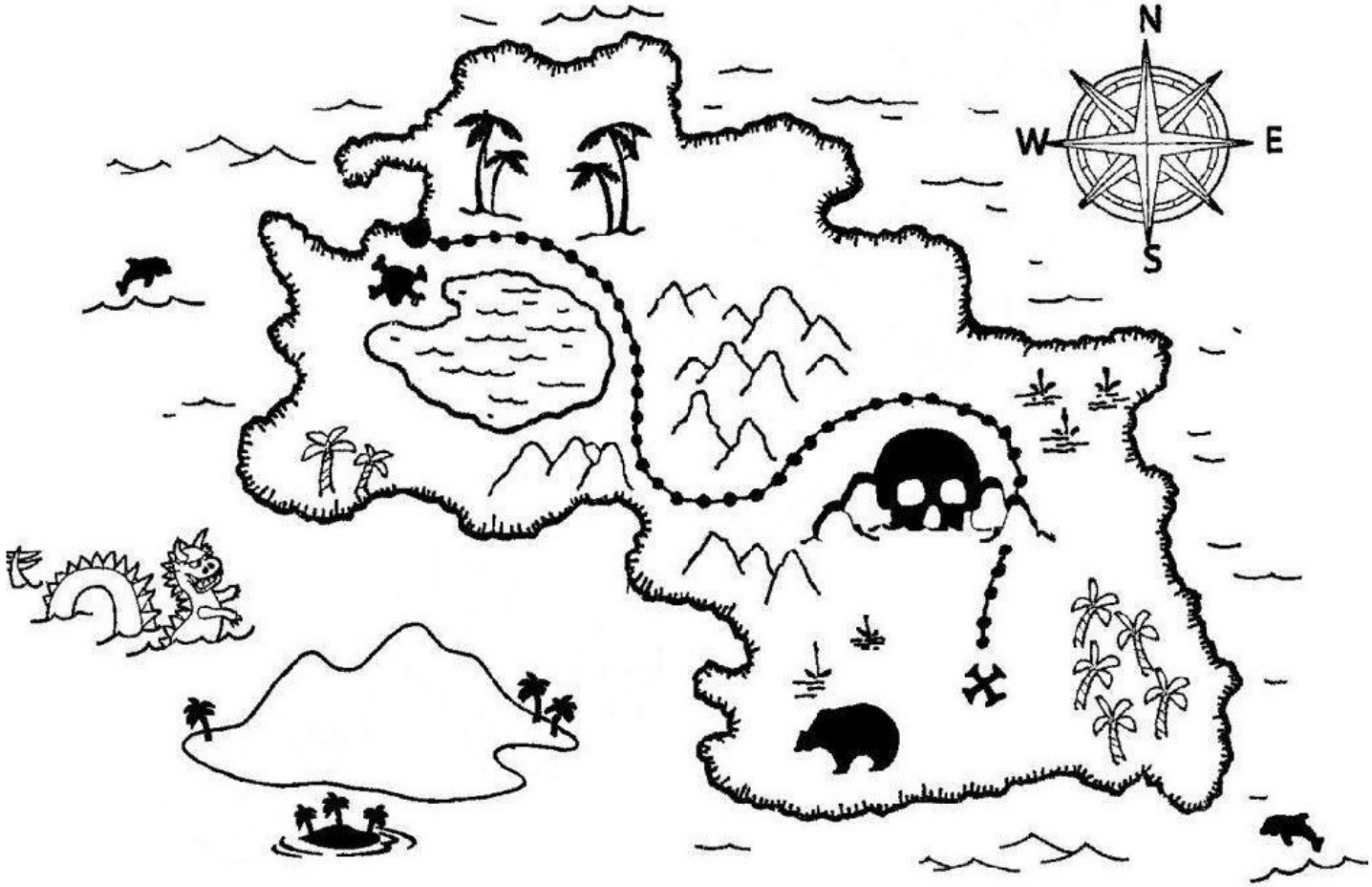
F.1.2 Week 2: planning and mapping ideas

will lunch time be a different time
what time is lunch and break times?
wot is the time to go home
how many stairs are in the school building
are the teachers nice?
will there be gym equipment's on the playground?
who would be my teacher.
where is the play ground?
How long is the lunchtime play
Will there be a school bell?
WITCH PLAYGROUND WILL WE USE
Where are the toilets and what do they look like?
will there be new teachers working in fairmead school?
will there be bell alarms again?
Where is the field?
Where are the toilets and what do they look like?
where do we go to transport and which teacher and tutor classroom would be!
how long wil i be at school
what are school meals are like?
how meny people will be in sahol
how big is the classroom
WHAT TIME DO WE HAVE LUNCH
DO WE HAVE FOOD
wot is the time table
WERE WILL WE HAVE ARE LUNCH
DO WE HAVE LUNCH
are going to have a bell after every lessen
how many new teachers will there be.
what does the classroom looks like
how big is the buliding
how long are the days?
WHAT IS IN THE BULDING
how many classrooms are there
how many stairs are in the school building
where are the elevator?
how big is the building
Who would my Teacher be?
Where is the sports hall?
were will the new class rooms be
how many classrooms are there?
WHERE IS THE STAIRS
wer wil we et
how many stairs are in the school building
How many people are in the building !
how many classrooms are in the school building.
were do I go
how many classrooms are in the school building.
will there be sports day?
are the teachers nice?
HOW DO I GET TO THE LOO

Which are the most important questions that need answering?



Find and label each of the numbered rooms on your maps of the school.



Look at the maps of the new building. Which side can we see from the classroom?

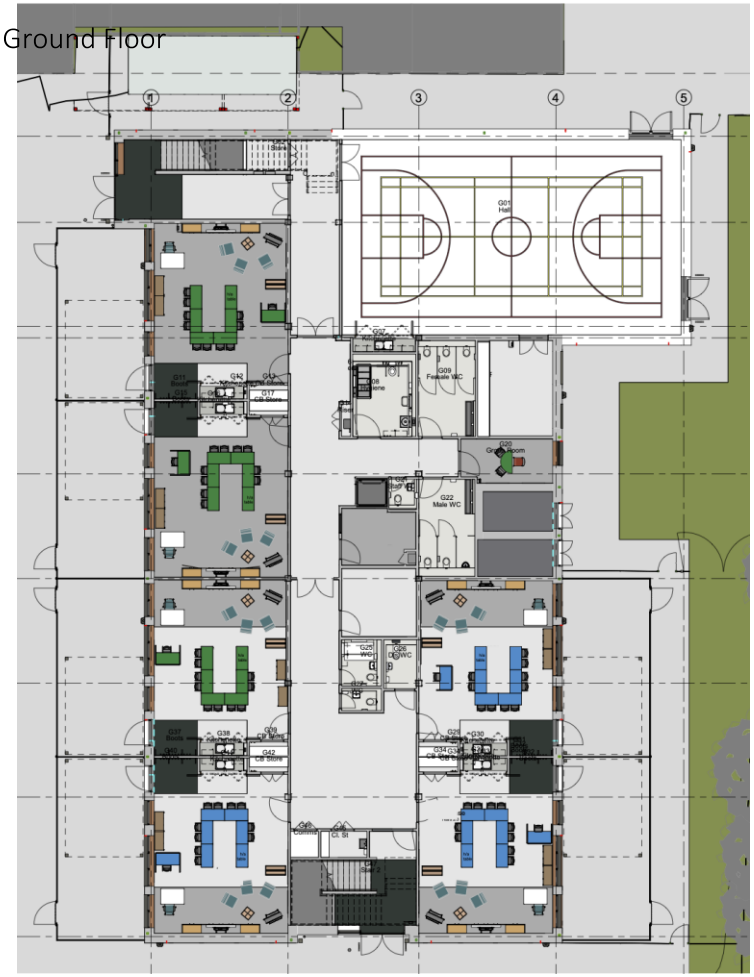
Question/ Theme:

Answers:

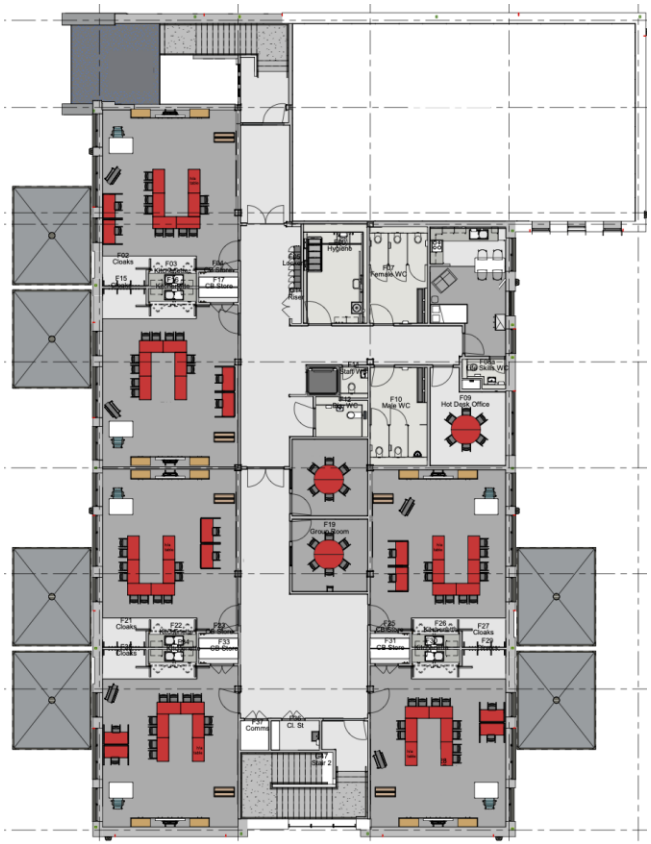
What can we film to show our ideas?
Where do we need to film?

F.1.3 Week 2: embodied navigation activity

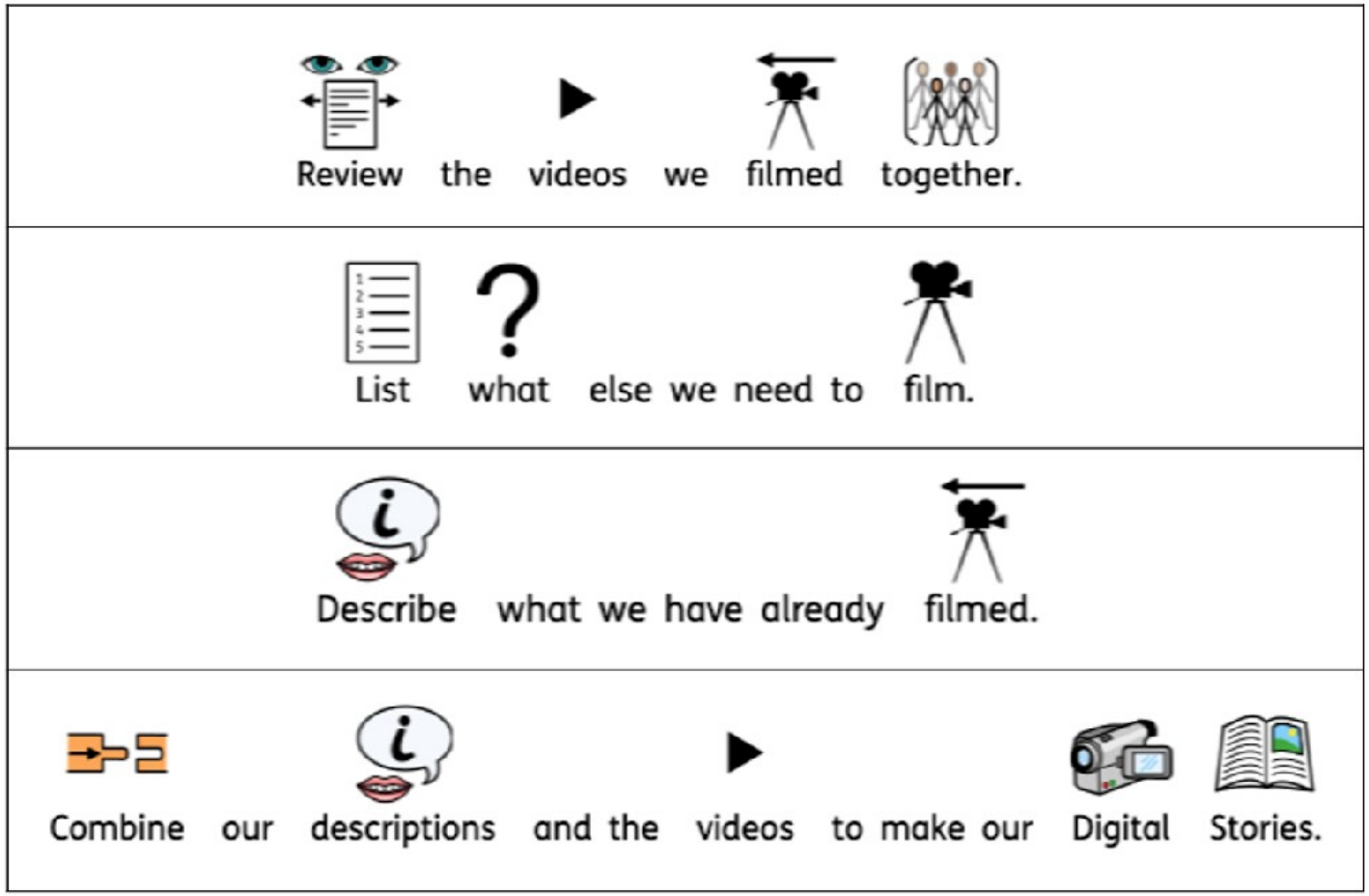
Ground Floor



First Floor



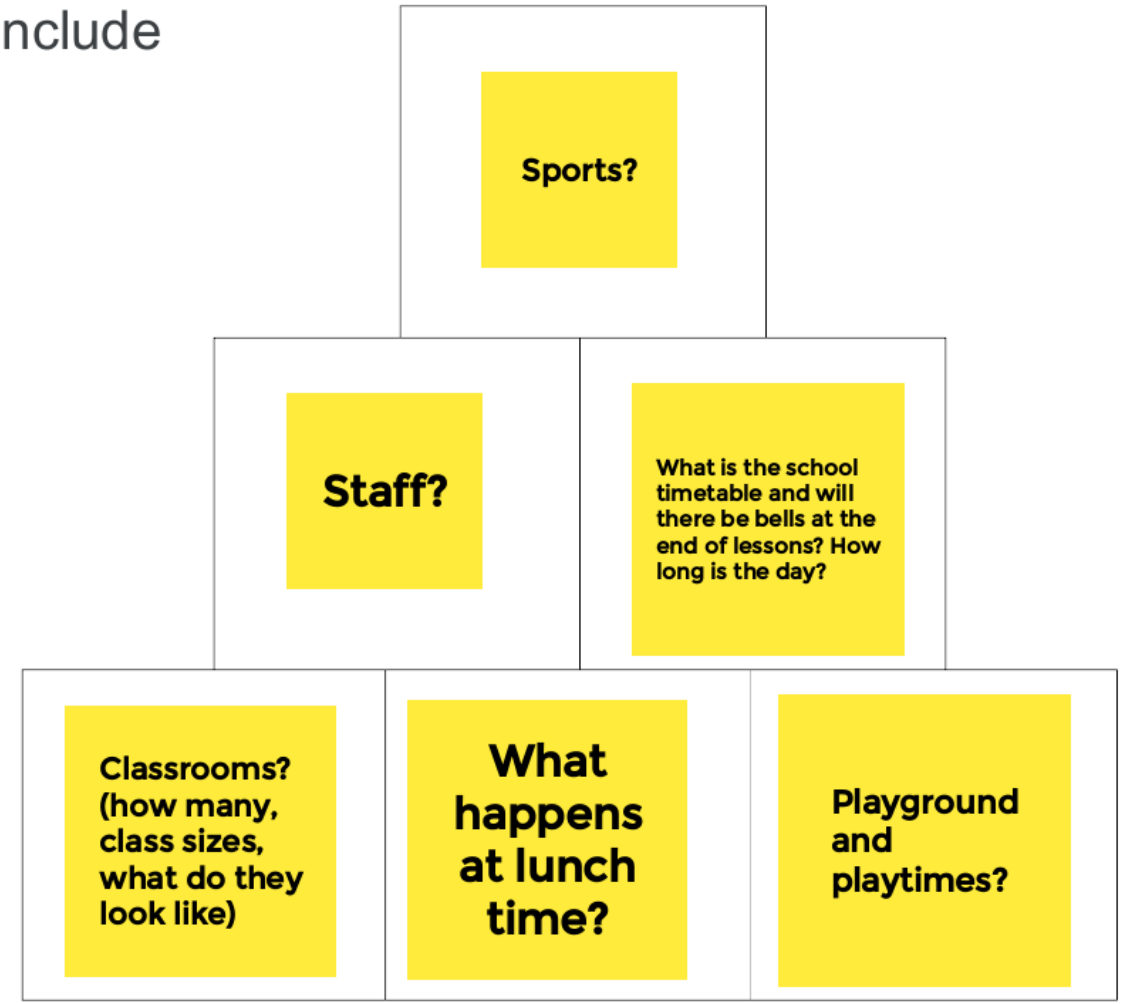
F.1.4 Week 5: describing and editing the digital stories



They are in:
P Drive > students > Darwin accessing the community > Digital Stories Footage

Watch the videos.

What we wanted to include in our videos...



Question/ Theme:

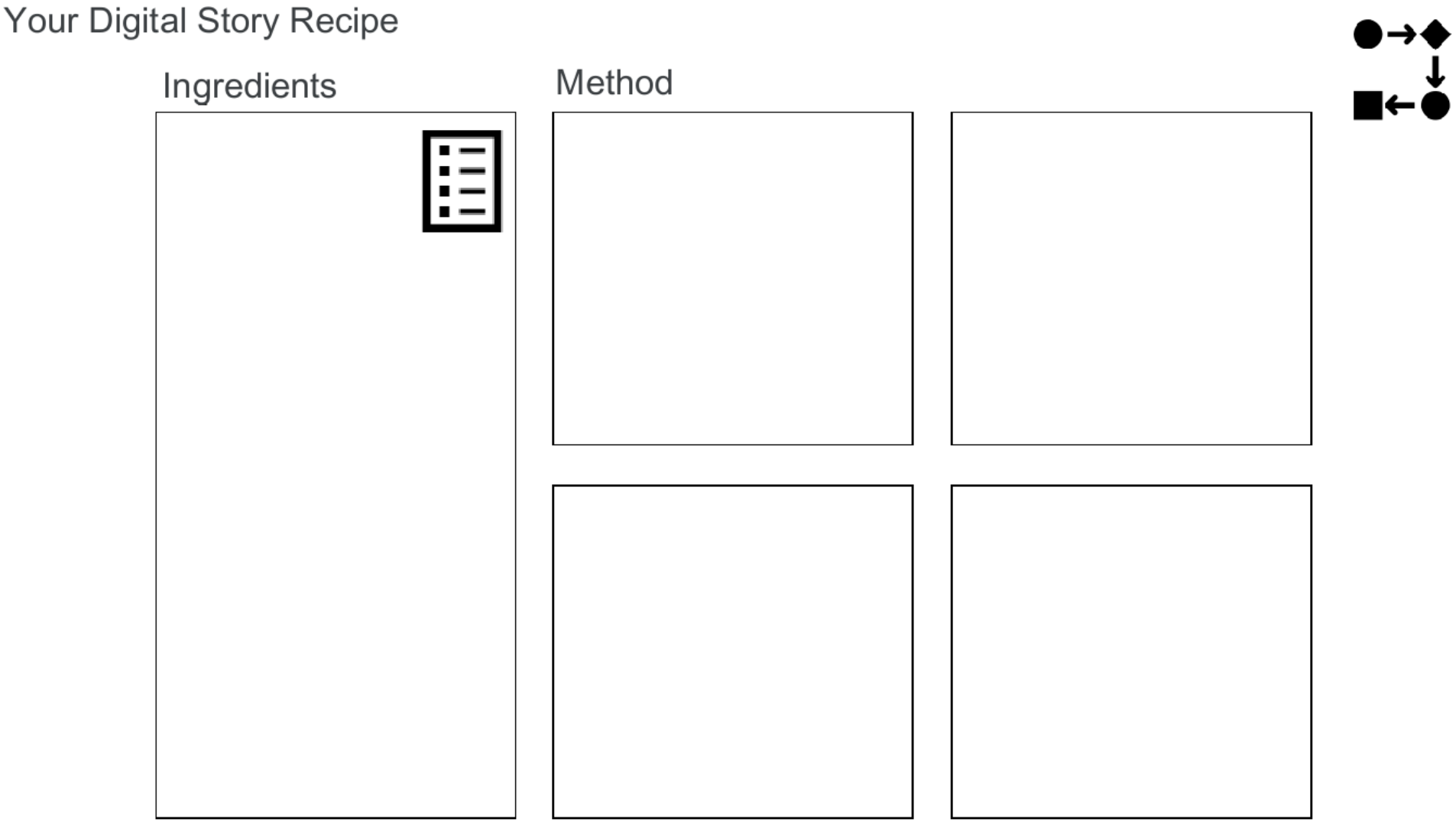
What else do we need to film?

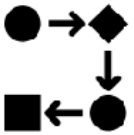
List what else we need to film.

What have we filmed to show our ideas?

Describe what we have already filmed.

F.2 Phase two resources: recipes and reviews worksheet

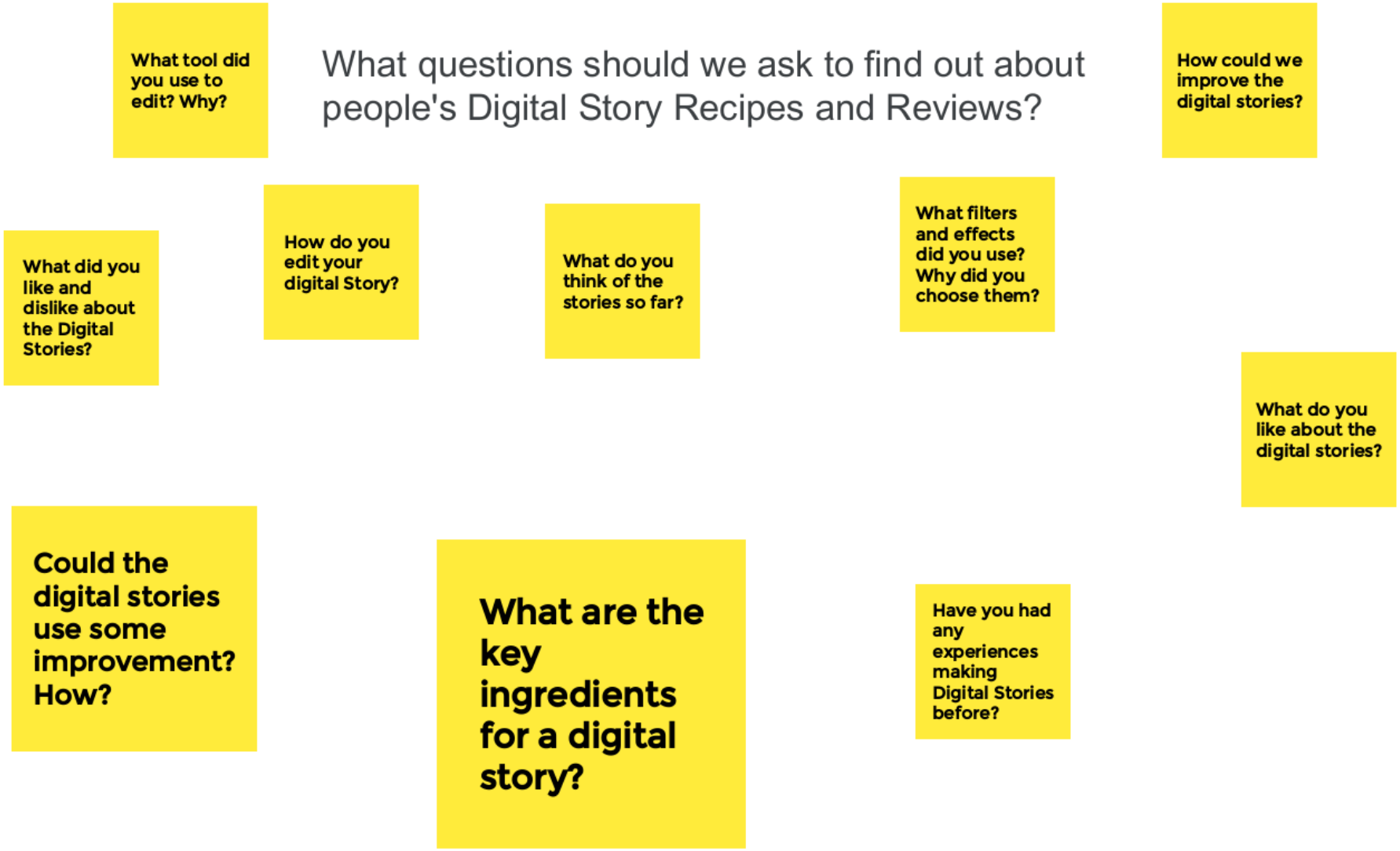




Your Digital Story Review

What did you like/dislike about the Digital Stories? How could we make them better?

F.3 Co-produced interview schedule



F.4 Certificate of participation

Certificate of Appreciation

This certificate is presented to

.....

to recognise their valuable contribution as **Co-creator** in their project to develop Digital Stories about the school.

It is proudly awarded on behalf of

Verity Ward
PhD Candidate

VCWard

On 15th December, 2021

FAIRMEAD SCHOOL
'To be the best we can be'

Autism Community Research Network
ACoRNS
Southampton

UNIVERSITY OF Southampton

Appendix G Analysis for study two

G.1 Micro-level transcript for digital story about classrooms

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:00	1	Josh is stood in a dimly lit classroom, next to the teacher's desk and in front of the smart board. To the front of the frame in the bottom left hand corner we see a girl sat to the desk, with a pink pencil case and water bottle in front of her. Next to her we see a laptop screen, which fills the bottom right of the frame. An animation of two	The clip starts with a low honk. The animation is accompanied by an electronic sizzle, and then a pop as the orbs disappear.	Josh	[Honk] and this is Darwin class.	The music begins with a rocky driving bass riff, the guitar joins with a few spread chords				

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		space portals appear into the centre and right of the screen. They are circular, with animated blue lightening bolts as the border. The portals materialise from blue sparks which join to form a mini-explosion which the portals expand from. They shrinks and then the blue lightening border expands as they disappear, leaving sparkly bubbles where they once were.								

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:02		Josh steps to the left, and looks at the smart board, then he looks around behind him before returning to look at the camera. The student lowers her head to her hands on the desk as Josh looks back to the smartboard.		Josh	This is where we are from Monday to Friday					
00:00:07		Josh uses his left hand to indicate to the whiteboard, then waves his hand in a circular movement to emphasise it. HE then walks towards the camera and indicates with his		Josh	This is our whiteboard these are our desks.	The drum kit joins, and the guitar begins with fervour. They play a repeated rock riff.				Josh over-annunciates as if he's not sure what to say

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		right hand to the desks in the rest of the classroom. We see the student watch him as he walks through the classroom. The camera wobbles slightly and follows him as he moves.								
00:00:14		Josh pauses as he surveys the classroom once more before turning back to the camera. He raises both hands as he talks, then moves to the left of the frame slightly.		Josh	and, yes, this is Darwin class.					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:17	2	A bright pink background fills the frame. Three orange flecked stripes appear in the bottom left corner, as if applied with a pain brush. Writing appears over the jaunty stripes.				The guitar and drumkit drop out and the bass does a refrain, consisting of repeated notes and then a glissando.	We cut abruptly to the next shot without any transition animation. The writing appears as if falling from behind the camera onto the frame.	this is Darwin class	Thick wight flecked font, as if stencilled on with a sponge	
00:00:20	3	The picture is in greyscale, with a greenish tint and a pixelated filter applied, which blurs the image a it. We can still see Josh is	The clip starts with a low honk. We hear some clattering in the background,	Josh	[Honk] here, we are in the school kitchen. And this is where, uh, students come here to	The guitar and drums join again, with the cymbals adding to the energy now.	The camera cuts to the next shot without a transition animation.			

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		stood in a school kitchen, next to a hob and sink on an island, and with a fridge/freezer and a whiteboard to the left. The camera wobbles slightly and drifts from right to left. Josh leans one hand on the worktop to his left, raising it occasionally to gesture to the room.	which is almost as loud as Josh's speech.		learn how to cook.					
00:00:33	4	The footage is in greyscale again, but with a warmer tone and with a clear picture. Safiya and Josh are stood at either side of the	We hear the a lot of people chatting in the background, as well as a low and then	Josh	Hello! It's [low honk] and [high honk] here from Darwin Class	The bass refrain begins again	The camera cuts to the next shot without a transition animation.			

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		screen in front of a wooden picket fence. Behind them we see a couple of permanent gazebo-typed structures, which are wrapped in foam round the bottom. There are tyres on the floor, and lines painted too. To the back of the frame, we see the tall metal fence marking the perimeter of the school, and the hedges and beyond. Josh gestures to Safiya as he mentions her name.	a higher honk.							

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:00:37		Josh gestures to Safiya again with his left hand. The camera moves shakily to centre Safiya.	The chatting continues in the background.	Josh	And, uh, *honk* would you like to tell people where we are?	The bass returns to the same riff the music started with.				
00:00:41		Safiya turns to look at the playground behind her as she talks.		Safiya	We are in the playground.					Safiya speaks quietly it is difficult to hear what she says.
00:00:43		The camera zooms in a little, unsteadily. It zooms out a little to show Josh as he talks. It zooms in and out a few times more to show the playground and the		Josh	We are, we, we, yep. We are in a primary class, and this is their little playground. And this is Owlets.					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		context of Josh talking to camera.								
00:00:54	5	Josh and Safiya are stood next to the soft play equipment, which is enclosed by rope mesh, and green and purple foam-wrapped structural bars. Behind them is a doorway to the hall, with brightly coloured tables and chairs. Josh indicates to the camera with his hands as he talks. The camera moves unsteadily to centre Safiya, showing more		Josh	[Low honk] and [high honk] here, and [high honk] would you like to tell us where we are?	The drumkit, cymbals and guitar join to play a rocky riff as the music builds again.	The camera cuts to the next shot without a transition animation.			

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		of the soft play equipment next to her.								
00:00:59		The camera wobbles, then zooms out and in, to show more of Safiya's face.		Safiya	Um, the soft play room.					Safiya talks very quietly
00:01:01		The camera moves to show Josh's face a he responds, glancing back to the camera as he does so. The camera wobbles, then zooms out as he talks.		Josh	Yes, this is the soft play room where, uh, primary, key stage three, and four like to come to, don't they?					
00:01:09		The camera moves slightly back towards Safiya as she responds.		Safiya	Yeah					Almost inaudibly

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:01:09	6	The picture is bright, and colourful, with a pixelated mosaic filter applied meaning we cannot see the detail. Josh is stood in front of two tall book shelves, which almost reach the ceiling. He is just off-centre to the right, and to his right we see the door, and wall, the fire extinguisher and a beanbag on the floor. He shifts his weight from left to right as he talks, and gestures to the shelves, turning to		Josh	Hello, I'm *honk* and we are in the school library and as you can see we have lots of books here, for, um, the children to choose which book they would like to read.	The cymbals drop out. The guitar, bass and drums continue the repetitive, energetic riff.	The camera cuts to the next shot without a transition animation.			

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		look at them as he does so. The camera wobbles, unsteadily. As it does this the colours of the mosaic blocks dance as they adjust to the movement.								
00:01:22	7	Josh stands in th ecorridor outside the door to the DT room. There is a diplay on the wall on the far right of shot, and behind him, to the left, there is an external blue door. As he talks he looks towards the DT room door, gesturing across his body with		Josh	Hello, and this is the DT and science room, this is where our students will come to learn about DT and science		The camera cuts to the next shot without a transition animation.			

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		his hand. As he finishes he looks back to the camera.								
00:01:32	8	Josh and Safiya are stood in the hall. The picture is greyscale again, with a greenish tint and a pixelated mosaic filter. Safiya stands with her arms out, and Josh clasps his together in front of him.		Josh	It's [low honk] and [high honk] here.		The camera cuts to the next shot without a transition animation.			
00:01:34		Josh indicates to Safiya and the camera. The camera drifts towards Safiya.		Josh	[high honk] would you like to tell everyone where we are?					

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
00:01:36		Safiya walks forwards and waves her hands in a low arc, as if dancing. She looks up at the camera as she finishes speaking.	Safiya's voice echoes in the otherwise empty hall	Safiya	We are in the hall.	The guitar and drumkit drop out, as the bass repeats the refrain.				Safiya talks more loudly and confidently this time, addressing the camera directly
00:01:38		The camera moves to the right, to show Josh responding, and cuts Safiya out the picture. It zooms in on Josh's face, then zooms out again, and drifts to the right to show more of the hall. It then pans to the left, to show Josh talking with his hands together, and	We hear a little white noise after Josh finishes talking before the end of the clip	Josh	So, yes, this is, uh, the Fairmead School hall where we have our assemblies and our Christmas, uh, plays.	The bass returns to the starting riff. Then it accentuates the end with a final rhythmic phrase, followed by two quick chords with the guitar and drums to				

Time	Shot number	Images	Sounds	Speaker	Utterance	Music	Transitions	Text	Font	Notes
		Safiya, only half in shot. She steps forwards and backwards, swinging her arms and smiling at the camera. The camera moves back to Josh, zooms in sighty, then out again to show Safiya, before floating to the right to show more of the hall just as the clip (and the video) ends.				punctuate the end of the music.				
00:01:52										End of video

G.2 Micro-level transcript for 360° immersive video about the DT and science room

Time	Images	Sounds	Speaker	Utterance	Notes
00:00	Erin and Tilly are stood in the middle of the room in front of two sets of desks, which face a whiteboard. Tilly holds her hands together, and looks at Erin as she talks.	We hear a beep of someone's fob and the sound of the door banging open just afer Erin finishes talking. In the background we hear the hum of the air conditioning.	Erin	This is the DT room. We do it in the afternoons.	
00:00:05	Tilly turns and points to the teachers desk and the whiteboard which are diagonally behind them. Erin looks at her as she talks. Erin pulls a hand to her top, and fiddles with a button.	We hear the door shut while Tilly talks.	Tilly	That's the, the teacher's there, and that's the whiteboard.	
00:00:12	Erin suddenly turns, and uses both hands to point to the shelves on the other side of the room. Tilly looks at her, then follows her pointing to look at the shelves to their right. They both look		Erin	And that's where we, we get the books.	Erin stumbles over her words slightly as she talks excitedly.

Time	Images	Sounds	Speaker	Utterance	Notes
	towards the camera as Erin finishes talking. Erin starts to make a gesture to cut the video.				
00:00:18					Video ends

G.3 Macro-level session transcript from week 3 (phase one)

Week 3 Transcript: Wednesday 23rd June

Today was a little different as Frank would be out of the lesson due to a meeting with an OFSTED representative. I arrived early, and picked up the cameras and the memory cards from the office. I walked over to the classroom, where the class were still having their lunch break. One of the students from my other coding study was sat outside the classroom, and we chatted about his music for the game, which he said he had finished today in ICT. The students smiled and greeted me as I came in the classroom, and I set my things down at the front of the classroom. I checked the cameras had memory cards, and plugged in one of the cameras which was not fully charged. One of the students explained that another who normally sits next to her was isolating as someone on her school bus had COVID. Kelly, who is [role redacted] came over and gave me a list of groups for the day, and explained that Frank had asked her to look over them, she said they seemed fine to her. I was glad, as I had been trying to think of a way to divide the class into groups sensibly, but really needed their input to make sure that students were happy in their groups. I asked about the students that were missing from the classroom, and Kelly explained that another TA would be down to cover Jayne who was not in today. I turned on my laptop on, and popped upstairs to grab the other tripod. When I came down Kelly was taking the register. When she had finished, she said that it was Accessing the community with me, and explained that Frank was out in a meeting, and that the group needed to be extra well-behaved as a consequence. They cheered when she said Frank wasn't coming, and seemed pleased that I was there to take the lesson.

I started by trying to plug in my laptop, and had to ask a TA to go and grab an adaptor for me. It took a couple of minutes to find the right one, and then when I had connected to the smart board, another showed me how to turn off the sound, which was making a buzzy noise where there was not audio from my laptop. I tried to ask the students whether anyone could remember what we did last lesson, but no one could. One student said that she had missed the last lesson, and I told her not to worry as we would review what we had done first thing. Eventually I got my laptop set up and opened up the Jamboard to show the schedule for the day. I talked them through the steps, and they all seemed interested and excited to get started.

Firstly, we quickly reviewed where we had got to in the last session. We went over our six key questions and themes. Then I organised the students into four groups, according to the list that Frank had left for me. I asked them to sit in their groups. I got a little confused as I tried to explain the groups according to where students were sat, and ended up reading one group out twice and

missing another. The students soon spotted my mistake and we sorted it out. The students moved to sit in their groups, and I started to explain the next activity: brainstorming ideas for what to film for each question or theme. I decided to assign the groups colours to keep track of which group was doing each one, and the students chose their groups' colours. Then we spent around 20 minutes thinking of ideas for each theme, on 3 minute rotations across each theme. I used a timer to help keep them moving across the themes, and the students seemed to like being able to see how long they had left to think of ideas. A TA supported each group, apart from one group which I supported. When I missed the timer, students helped by pointing out it had finished, and one student helped by counting down to set off the next timer. Carol disappeared out on a walk with one student for a bit, saying that he had had a difficult morning. They came back as we were finishing the last round of idea generation.

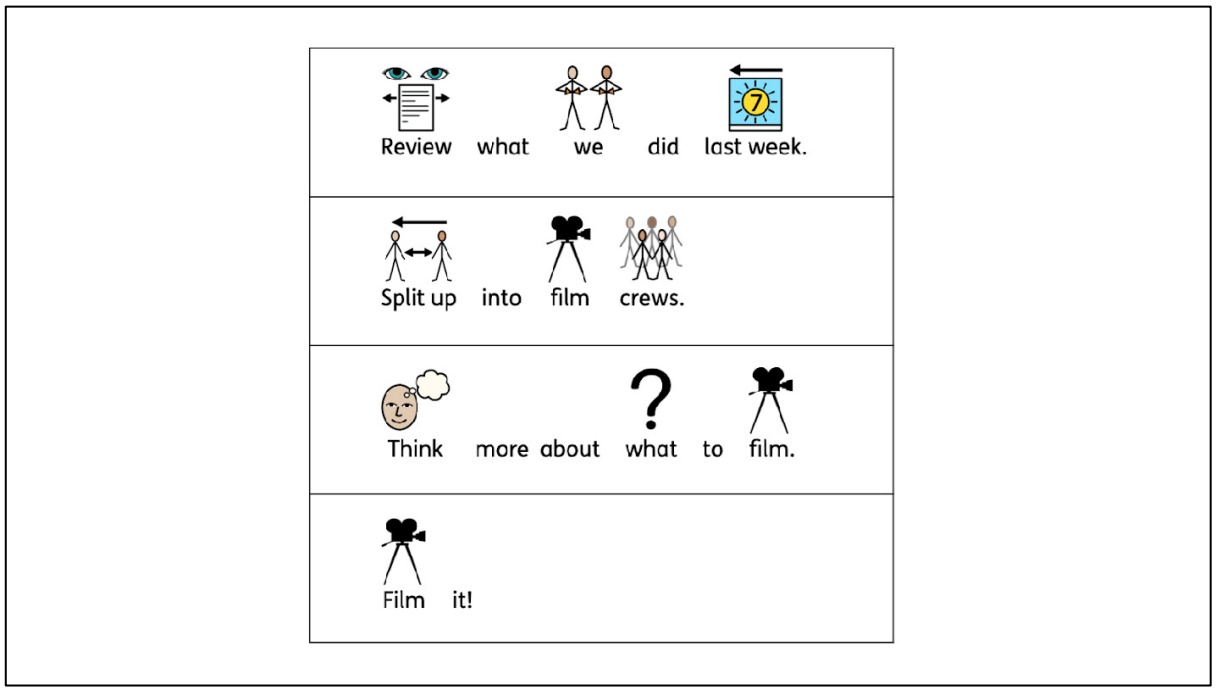


Figure G-1: Slide 1 from Jamboard for session 3 (as saved at the end of the session)

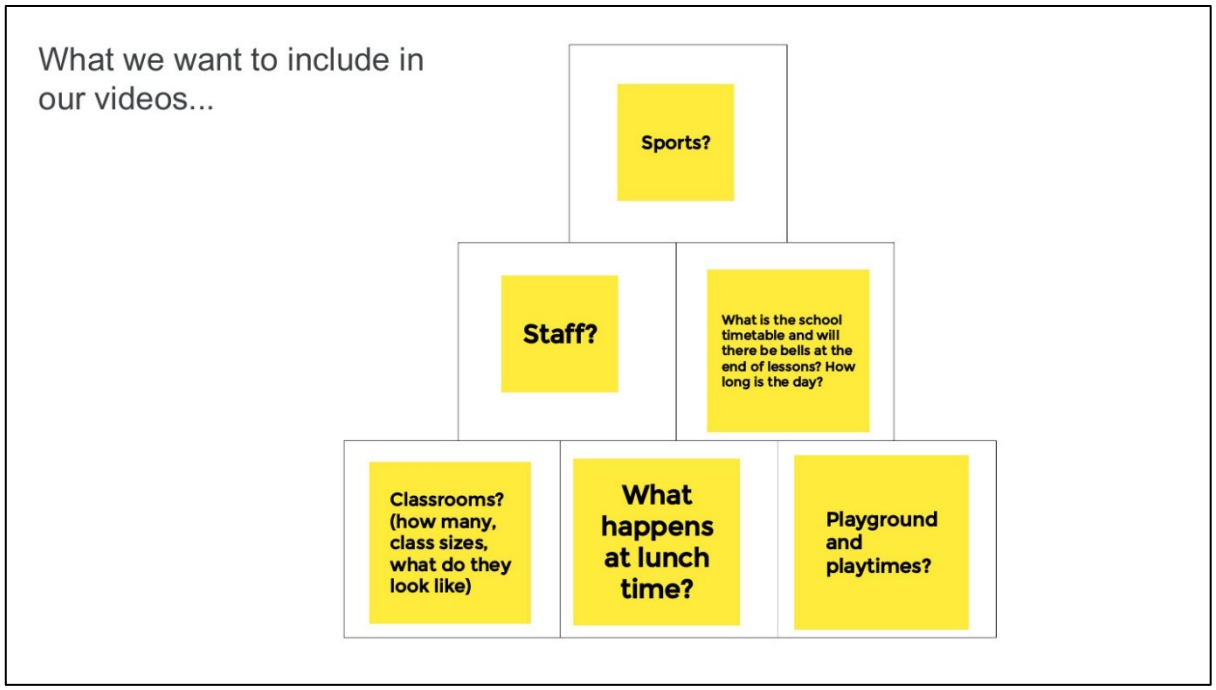


Figure G-2: Slide 2 from Jamboard for session 3 (as saved at the end of the session)

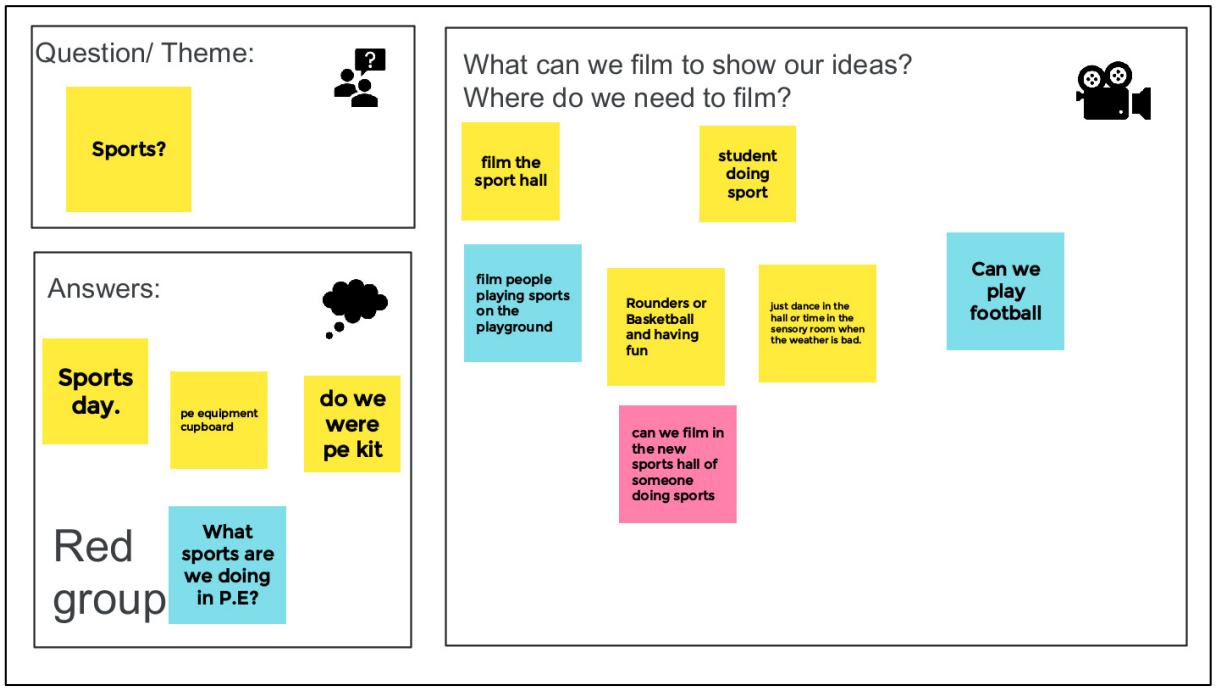


Figure G-3: Slide 3 from Jamboard for session 3 (as saved at the end of the session)

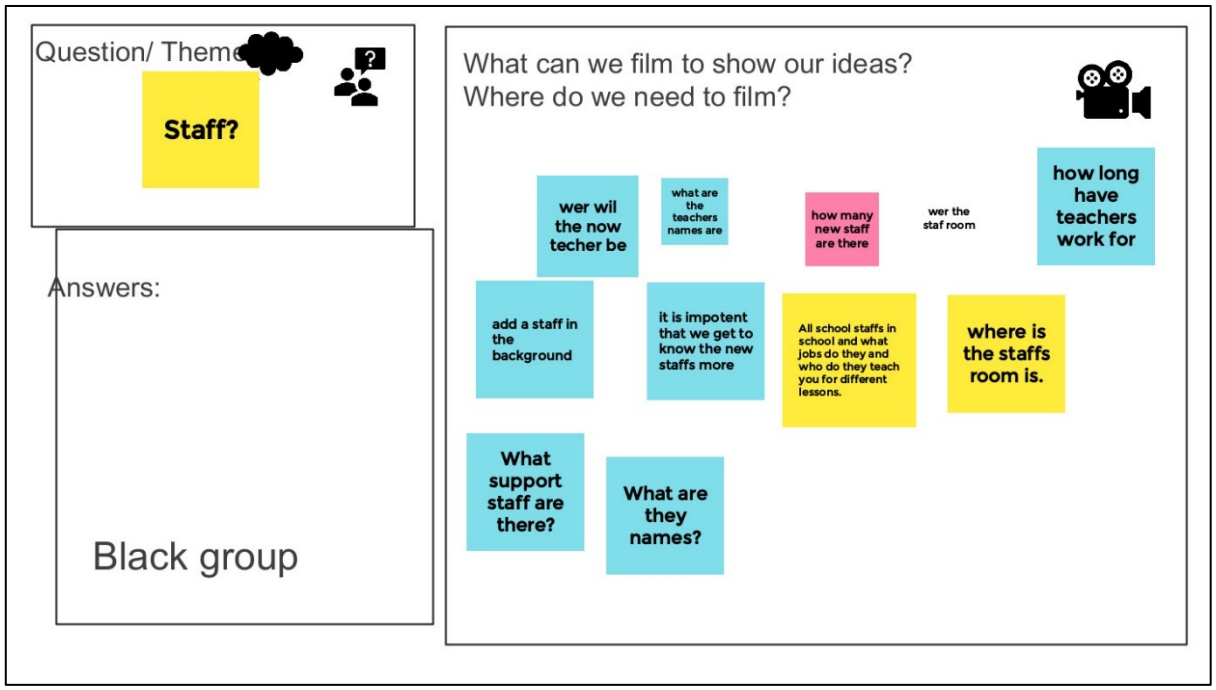


Figure G-4: Slide 4 from Jamboard for session 3 (as saved at the end of the session)

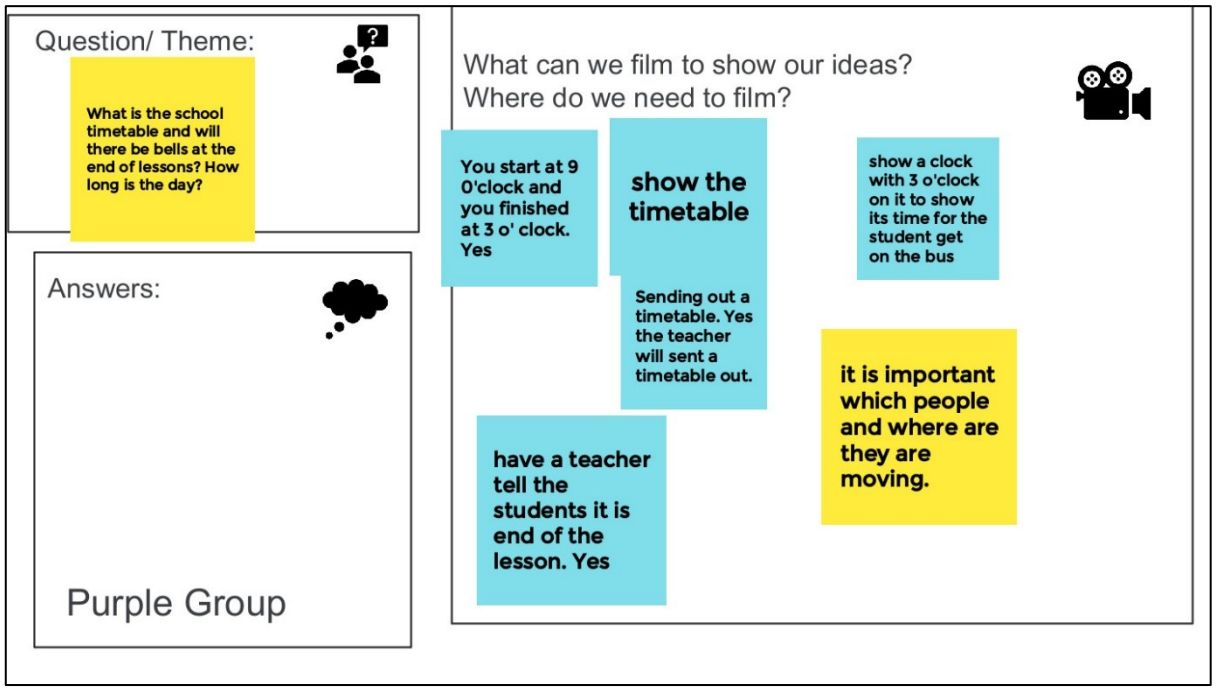


Figure G-5: Slide 5 from Jamboard for session 3 (as saved at the end of the session)

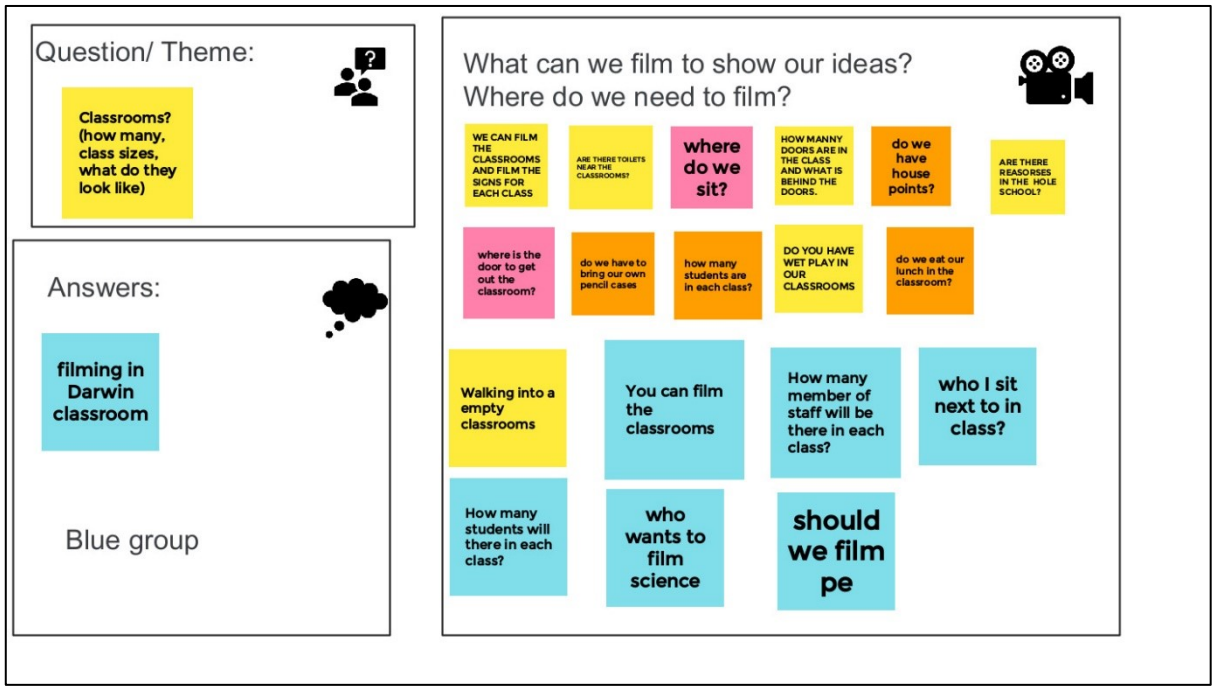


Figure G-6: Slide 6 from Jamboard for session 3 (as saved at the end of the session)

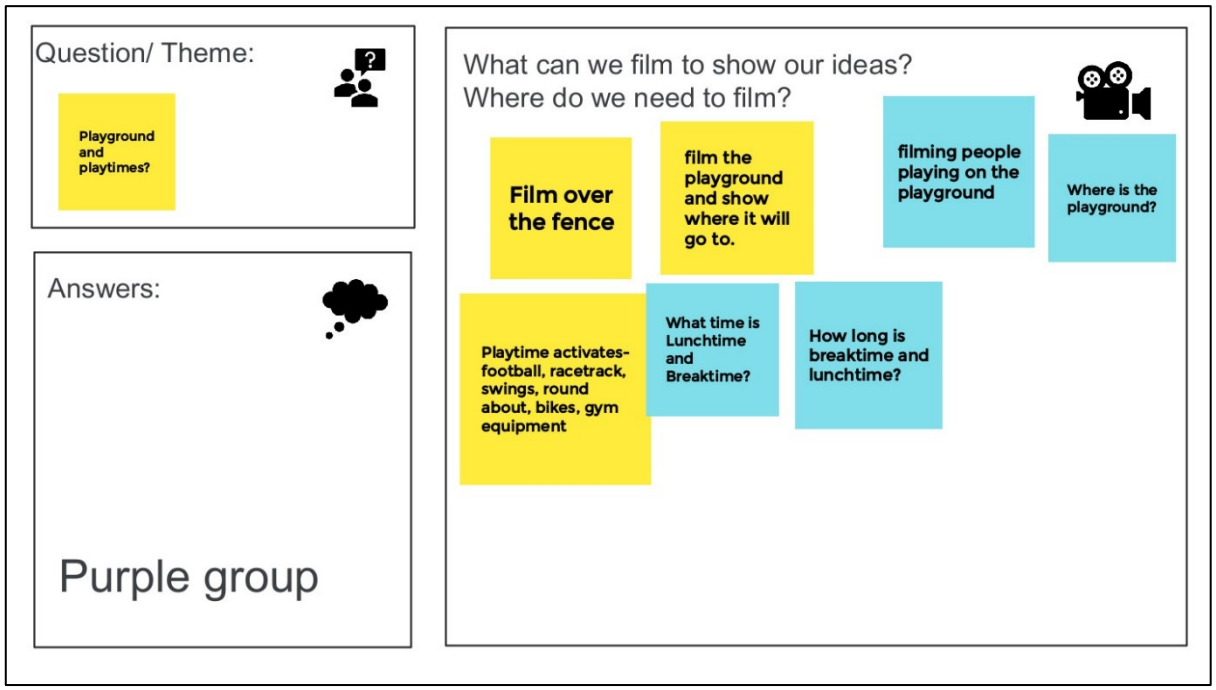


Figure G-7: Slide 7 from Jamboard for session 3 (as saved at the end of the session)

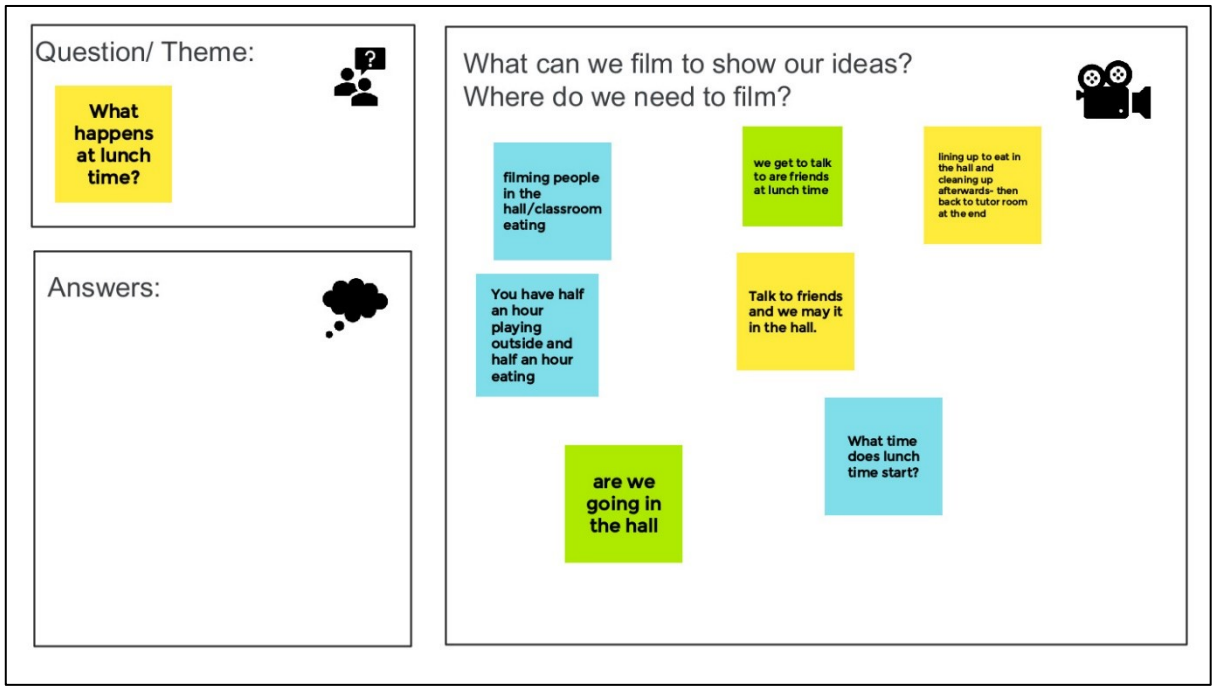


Figure G-8: Slide 8 from Jamboard for session 3 (as saved at the end of the session)

Next, I got out the cameras and gave a camera to each of the groups, explaining how they worked using the on/off buttons, the zoom, and the record button. I said that each group was going to focus on a different topic/theme and we discussed who would do each topic. One group volunteered for sports, but a very quiet voice from the other side of the room said, oh we'll have to do another one then. I knew the quiet voice belonged to Poppy, who had suggested sports as a topic herself, and said it was the most important thing to her. I explained this to the other group, who quickly volunteered to do another theme: staff. Poppy was pleased that her group would be able to do the topic she felt was important. The other groups chose a topic each, and I gave them another few minutes to discuss what they wanted to film before they went out to do so. In this time, one of the students was called away to a drama therapy session, leaving Archie on his own. I asked whether he would mind joining another group for the rest of the session, and he said he didn't mind so he went to help the group doing playgrounds and playtime. A TA joined each of the groups to make sure we didn't lose any students round the school, and I joined one of the groups, who had chosen staff as their topic. Their TA was providing 1:1 support to one of the students, so I tagged along to keep an eye on the other two. I told the students what time they needed to be back for the end of the lesson.

The group I was supporting wanted to film the office, but the TA with us said that students were not allowed in that part of school during the school day. I asked them what else they could do, and we grabbed a few members of staff to do impromptu interviews in the school playground. Terry held the camera, and Tilly did the interviewing, I asked them where they wanted the adults to stand, and where each of them should be, providing a little bit of direction about sunlight to

avoid glare down the lens. Tilly asked questions from just off-screen, and each of the three teachers spoke to her about what they liked about the school and why. Before interviewing each adult, they explained what we were doing, with each of them happy to be involved. The students also said about including a few other teachers, who were busy elsewhere in school. I said I would ask whether they could join us next week. Time was going on, and I realised it was nearing the end of the lesson. We walked back to the classroom and pack away our things.

I continued to clear away my things as the students waited for their buses to be called. While they did this, they played hang man on the whiteboard. Josh and I joined in, trying to help Tilly who was playing seriously while two of the boys had completely lost it in a fit of giggles. When she had finished one of the boys had a go, and then I did. Jason got it nearly immediately, and then I asked if anyone else wanted a go. The same boy asked to go again, and I heard Poppy say she would like to, so I asked if the boy wouldn't mind if she went first. He didn't so she went. She decided to write "Verity is the best" for her phrase for hangman. I said that was very sweet, and then her bus was called as she had to go. Though she is sometimes one of the quieter ones in class, I feel as though she values me taking the time to listen to her, and give her a chance when others are shouting louder.

When all the students had gone for their buses I spoke briefly to Kelly about the remaining plans for coding on Friday, and then dropped the cameras at reception and left. On my way out, I asked one of the teachers who had been requested for filming about next week, and she said she thought she was free, I said I would drop her an email to remind her.

G.4 Macro-level session transcript from week 9 (phase two)

Week 9 Transcript: Wednesday 8th December

I arrived early to check that we had everything ready for the lesson. The SLT office was empty, so I got out my laptop to check my emails. Soon another teacher came in, and said Frank was out but that he would be back soon. After a few minutes, he returned and we chatted through the plan for the lesson. He said he wanted to do a visual schedule for Jason, and we walked over to get ready for the lesson. By the time we got there, he realised we did not have time to print the visual schedule for Jason, a his first draft had timed-out without saving. I suggested I draw a schedule on the whiteboard, and he agreed that this might be a good solution. I let in the students and started drawing as they settled in. Frank put on a video of things being squashed under extreme pressure, to help calm, the students while he took the register, before telling a story about all the things that had gone wrong for him on holiday in the Seychelles.

We started the main lesson by running through the schedule, one of the students commented on my lack of drawing skills, and I questioned whether they knew what the pictures were meant to be, they did, so I responded that the drawings were ok. The students first went into their groups and logged onto the computers. I asked them to review their work from last week to see whether they had anything else to add, and we had a discussion about what they had included. I tried to encourage them to add some more detail, and Frank modelled extrapolating out the types of details they could add in to their method for their recipes. Then we gave them some more time to add in more detail to their recipes on their Jamboards, setting a timer for when we would join together again. I tried to talk to all of the groups, but found that some were happier being left to their own devices. In particular, I worked with Jay and Archie, and encouraged them to add their own knowledge about the different stages of making the digital stories. I pointed out who had knowledge by experience and this seemed to give Archie and Jay more confidence to add in details about making the stories and editing together the videos.

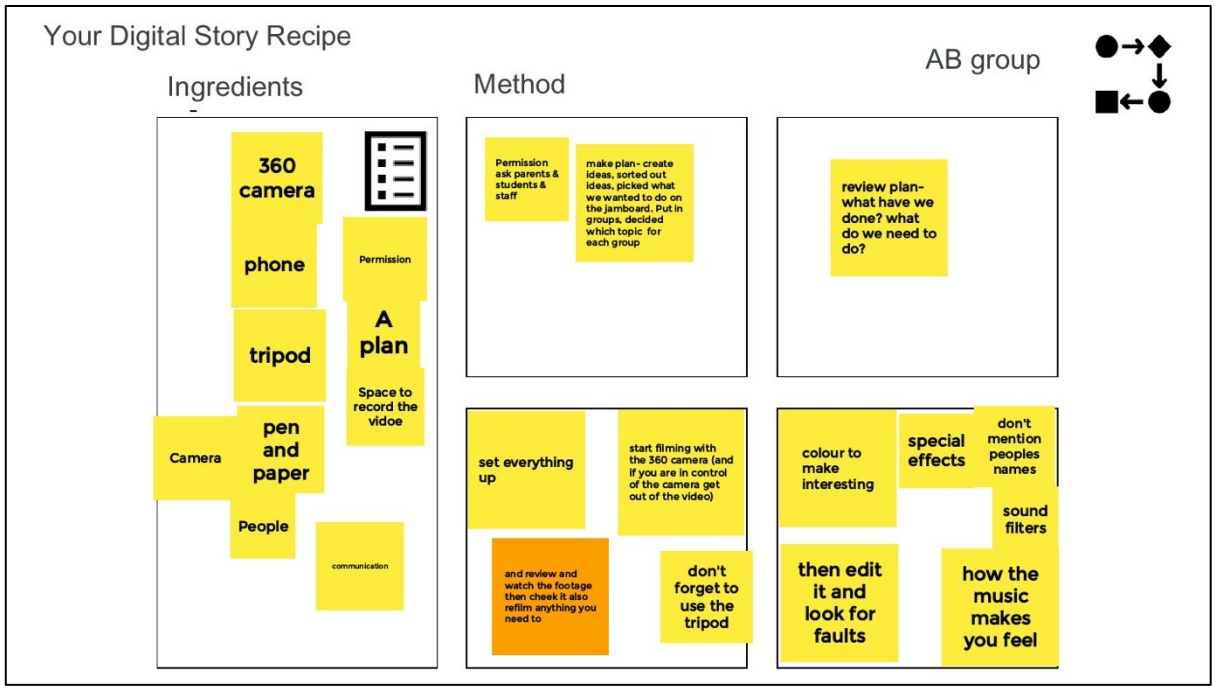


Figure G-9: Archie's recipe for digital stories

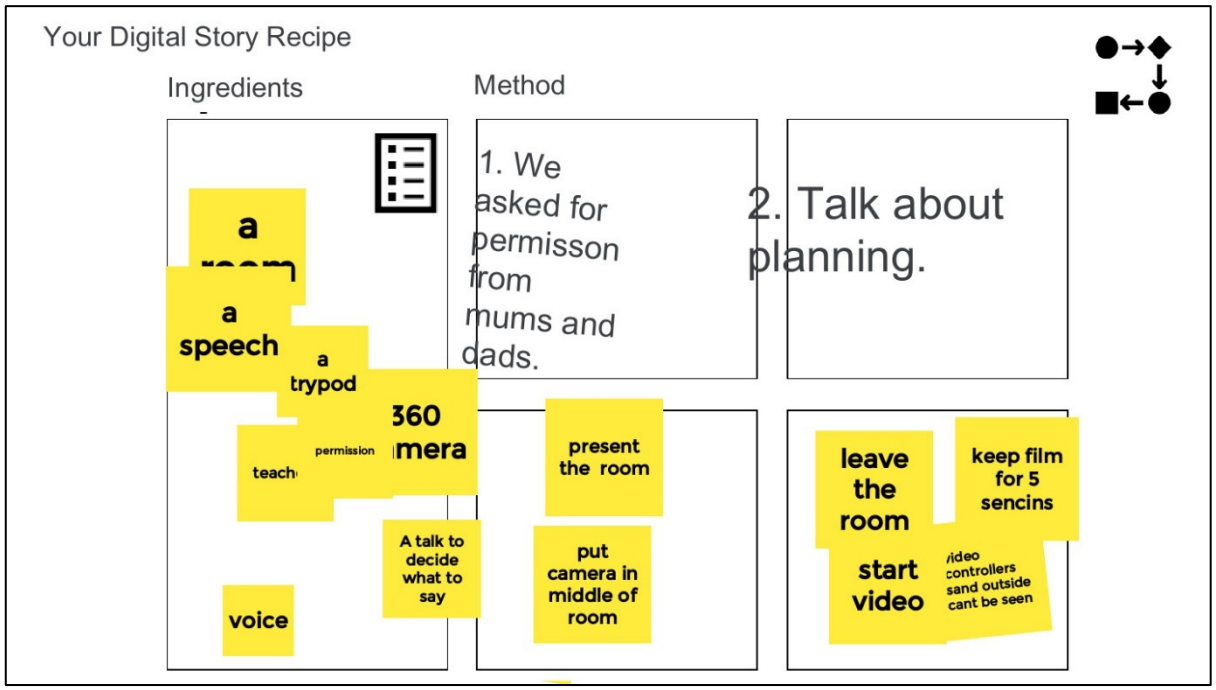


Figure G-10: Jason's recipe for digital stories

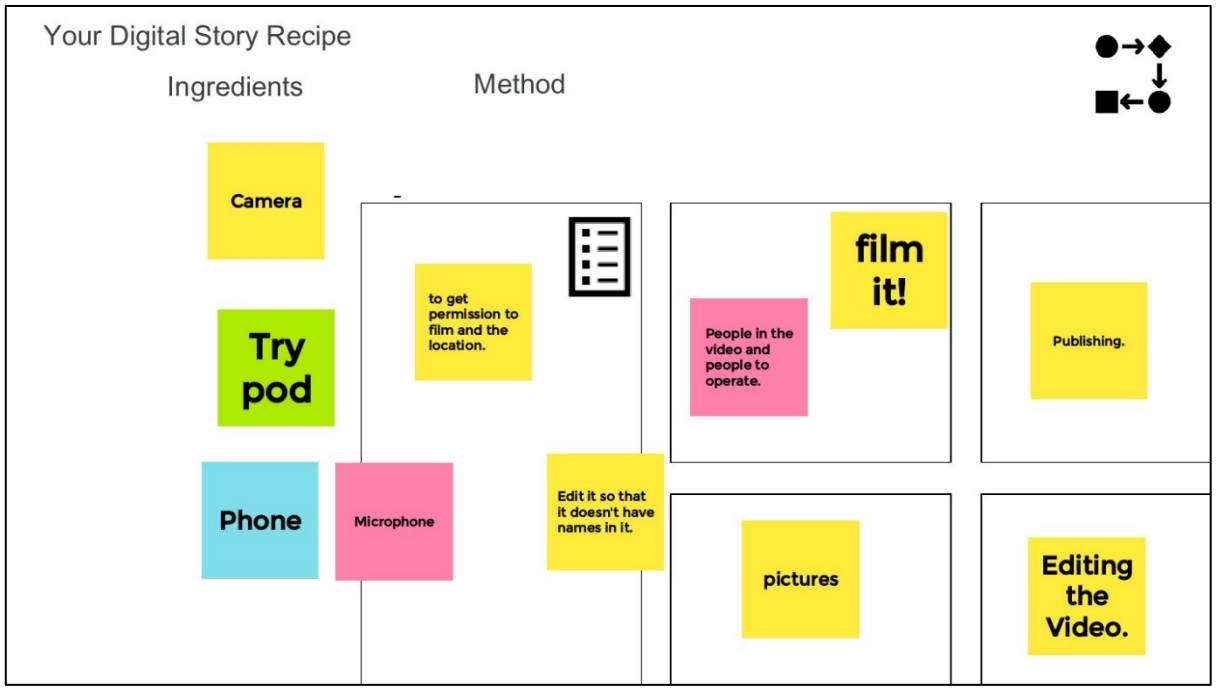


Figure G-11: Sean's recipe for digital stories- slide 1

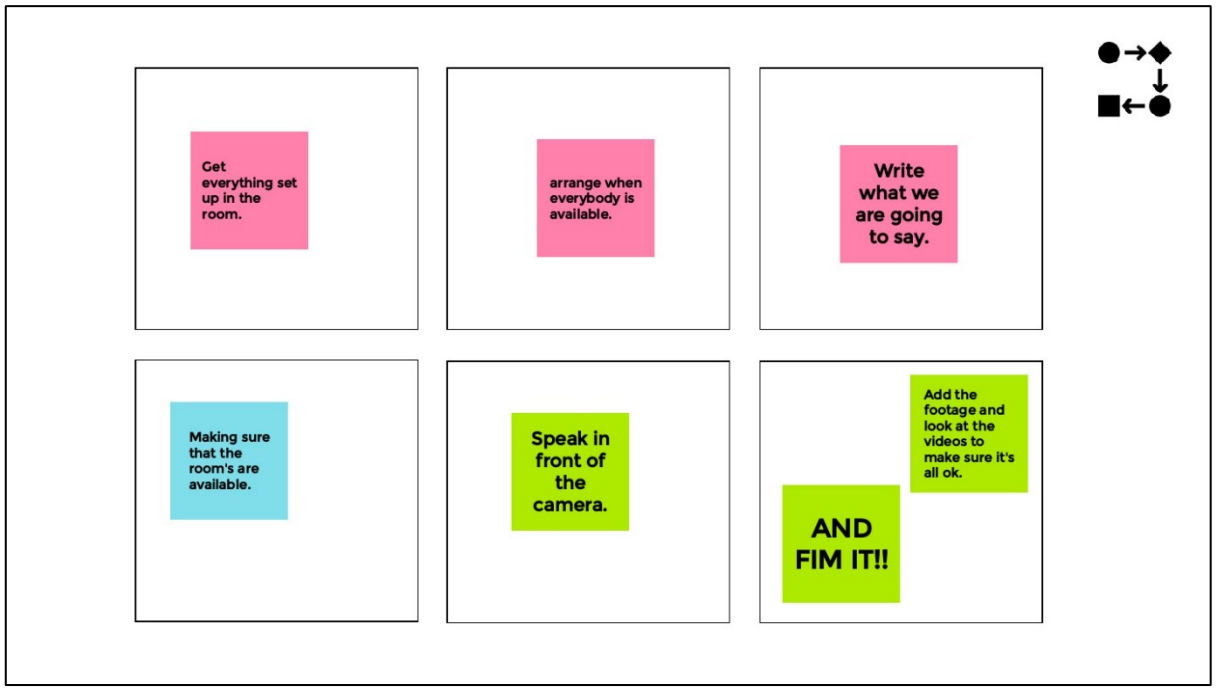


Figure G-12: Sean's recipe for digital stories- slide 2

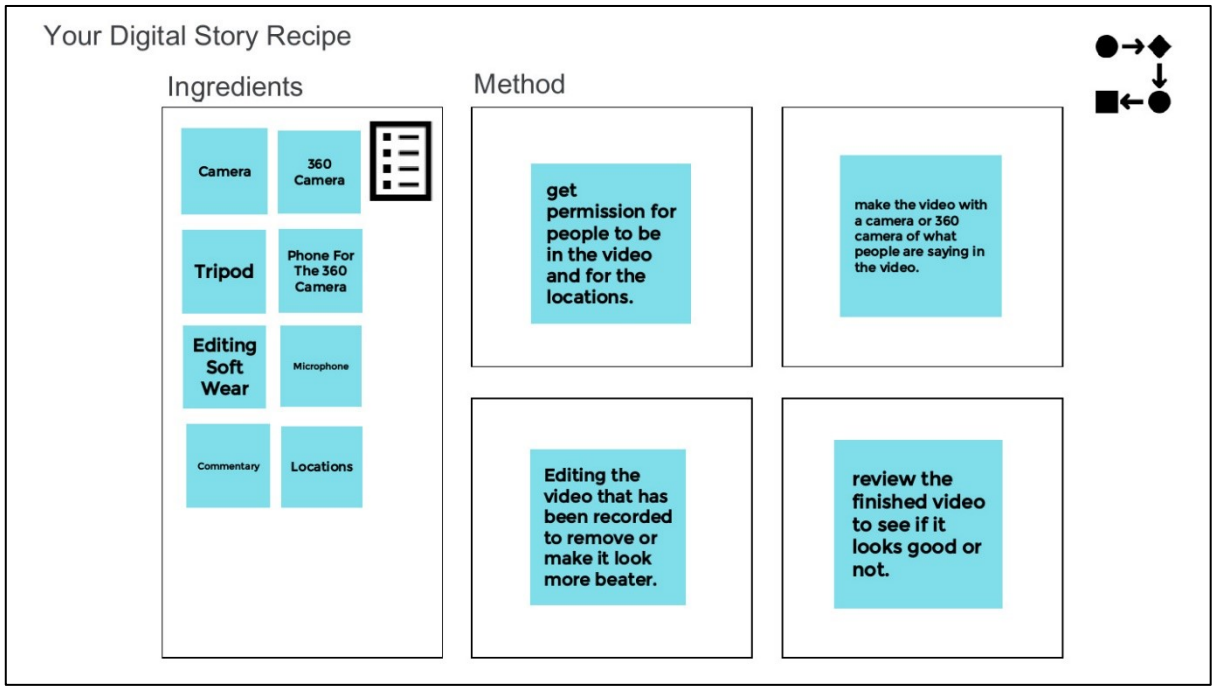


Figure G-13: Ted's recipe for digital stories

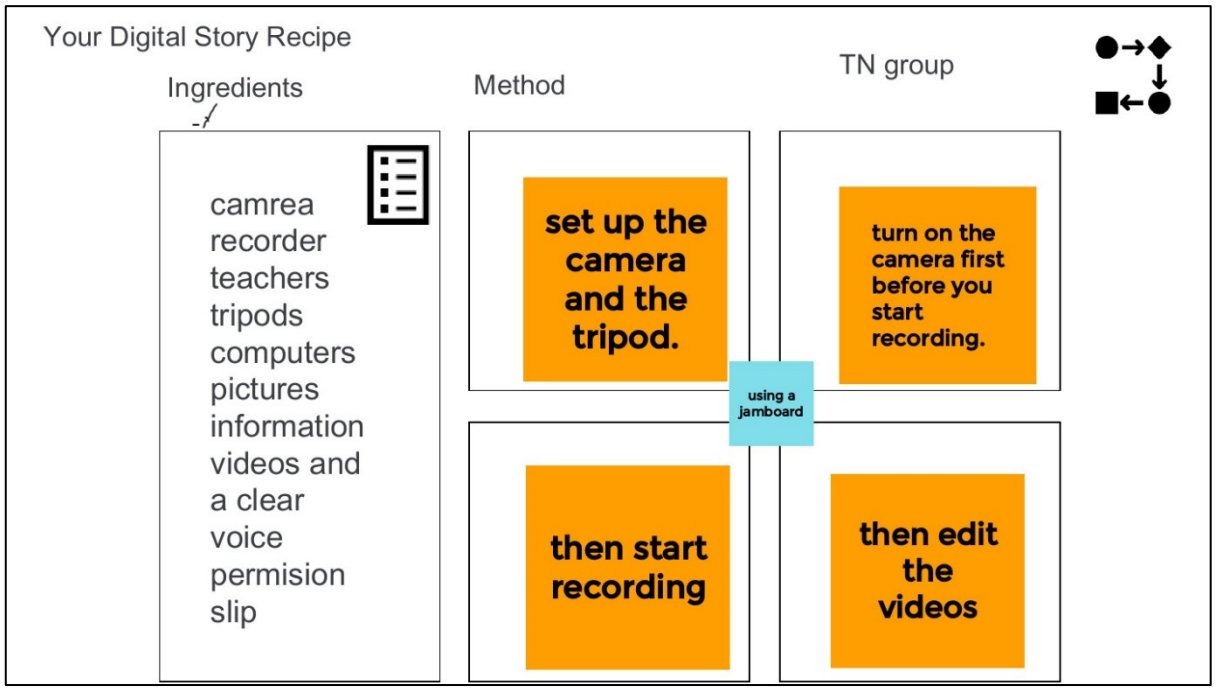


Figure G-14: Tilly's recipe for digital stories- slide 1

Figure G-15: Tilly's recipe for digital stories- slide 2

When the timer ended, we introduced the process of reviewing the digital stories. I explained the different ways they could do this, using the cameras, or the Jamboards, or using printed copies to draw pictures. They all seemed happy to use the Jamboard. Again, I tried to join each group to chat through their ideas. I worked for some time with Jay and Archie again, encouraging them to voice their opinions, and think critically about what they liked and disliked. While I was doing this I heard the TA talking to Tilly about hand flapping. Tilly had raised some concerns about hand flapping in the videos before, and had chosen to add this to her review. I wanted to add to the TA's positive attitude towards her hand flap stim, and check that she was happy with what we had already done. I went over and chatted to her a bit, and she still seemed a bit unsure. While I was chatting to her, she was looking at the screen, and I couldn't get a good gauge on how she felt. I asked her whether she would like to go for a walk round the playground with me to chat about it, and she said yes. While we were getting up to do this, the timer went off. I suggested to Frank that he chat through the reviews a bit while I went for a walk with Tilly. He agreed and I grabbed my mask to walk out the classroom (school policy is currently to wear masks when walking round the buildings).

While we walked, I talked about the importance of stimming, and tried to reassure her that it was not something to be worried about or a negative thing. I asked her what she was worried about and she said she didn't want to film her hand flapping in any further videos. I said that was fine, and checked if she was happy with the existing videos. He at first said she was, but when I offered to have another look to see if I could edit them to reduce the prominence of her stimming she said she would like me to do that. I explained that it would be good for other students to see

that the school was welcoming for students who stim, and really wanted to make clear that I did not see it as an issue, instead seeing it as a sign of how comfortable she was at school. She seemed happy with this solution, and we walked back to the lesson. While I will check to see what I can do about the video she is concerned about, I am mindful that I don't want her to feel ashamed about her stim, and so I don't really want to remove it completely. Nevertheless, I want to make sure she is happy so will take a look to see what I can do about the video this week.

When we got back to the classroom, Frank was still talking about their reviews and the need for criticality. I tried to explain about criticality and kindness, giving examples related to Franks story at the beginning of the lesson. The students laughed and found it funny. Frank then gave an example from the digital stories and the students went back to working on their reviews again. I went round the groups to see what they had come up with, and spoke in some detail to Sean and Ted. Sean said he had watched and used the videos over the holidays, and so I asked him to add a few details in about how he had used them and how they made him feel. As a user rather than a maker, his views will be really helpful in showing the usefulness of the videos. It soon came to the end of the lesson. Soon it came to the end of the lesson and it was time for the students to go home. We chatted through the plan for next week and the students packed up their things.

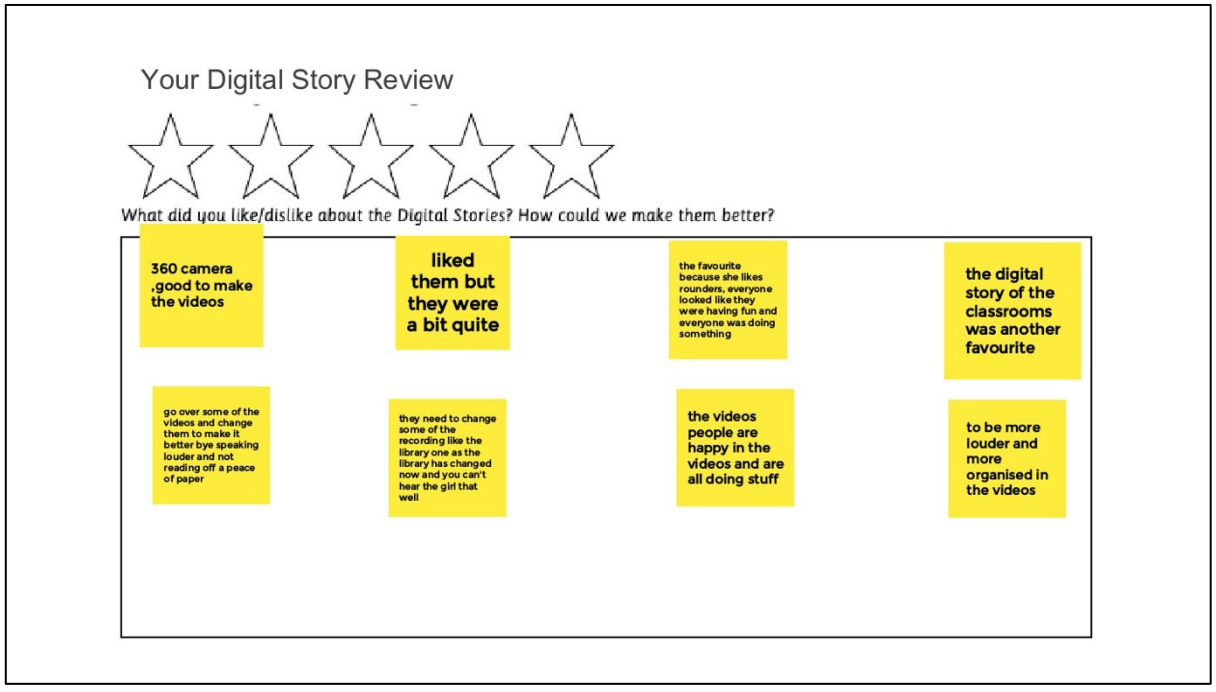


Figure G-16: Archie's digital story review

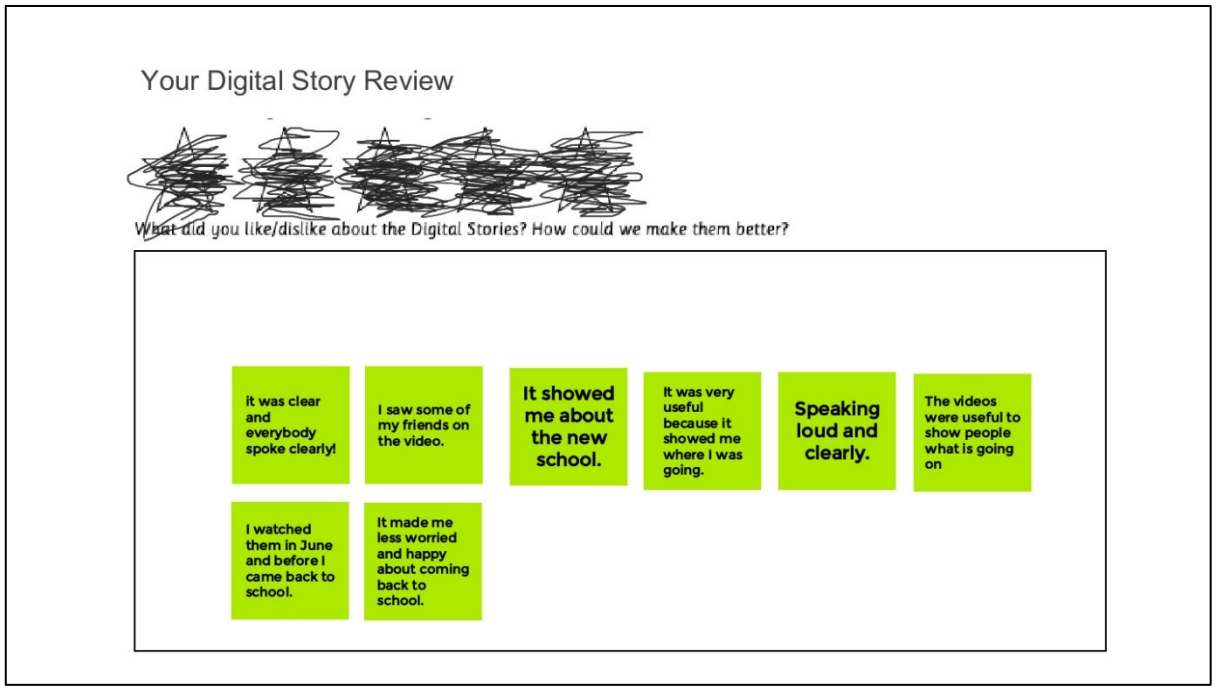


Figure G-17: Sean's digital story Review

Figure G-18: Ted's digital story Review

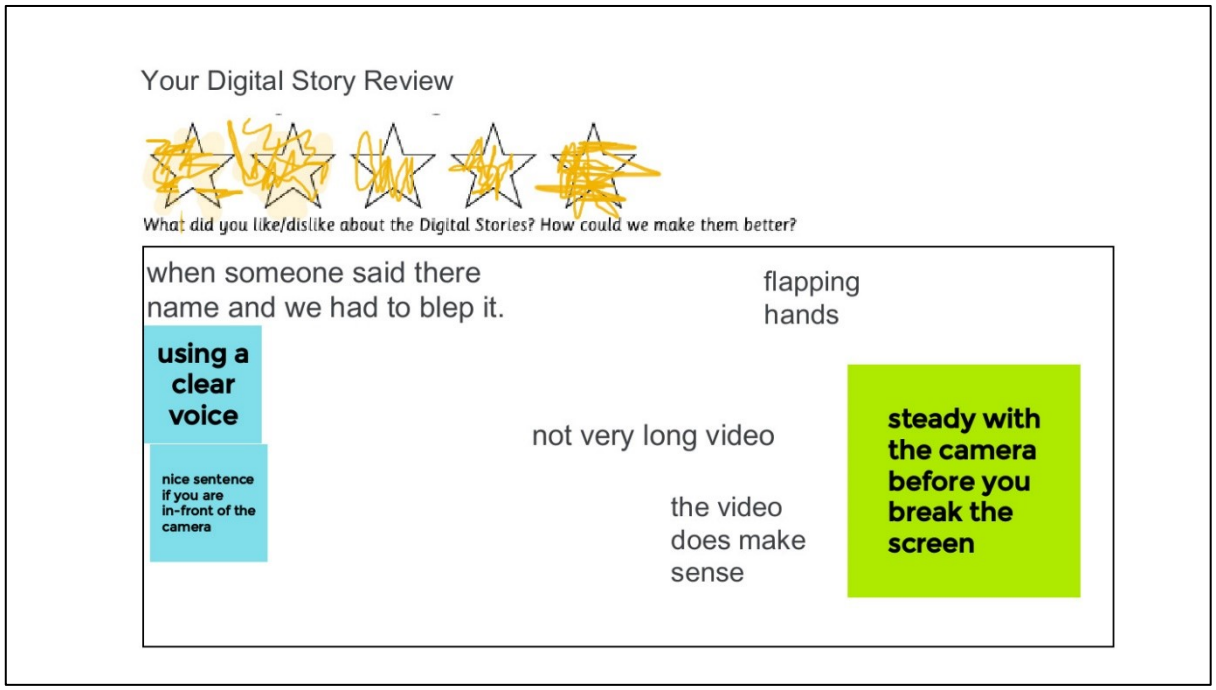
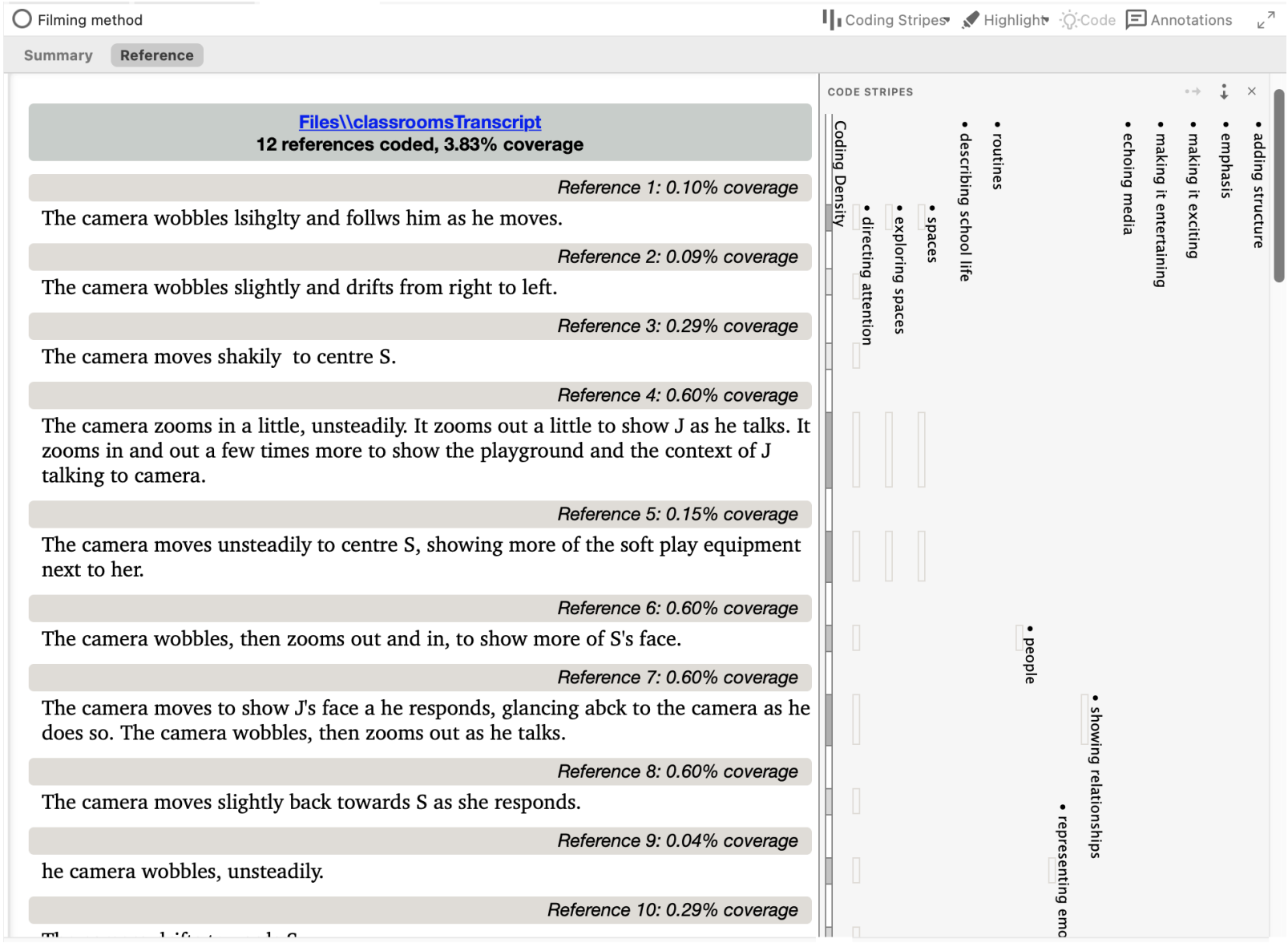
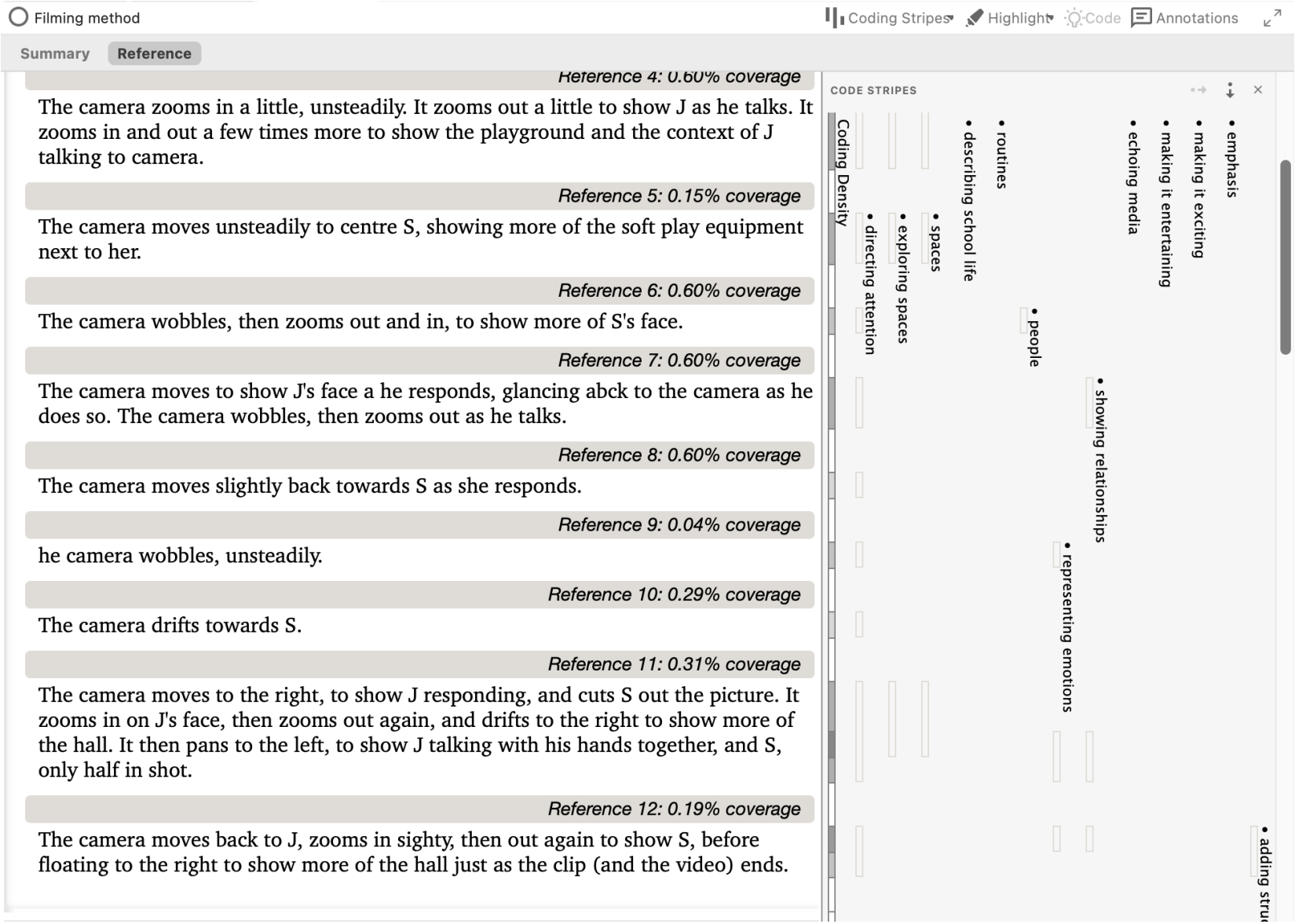


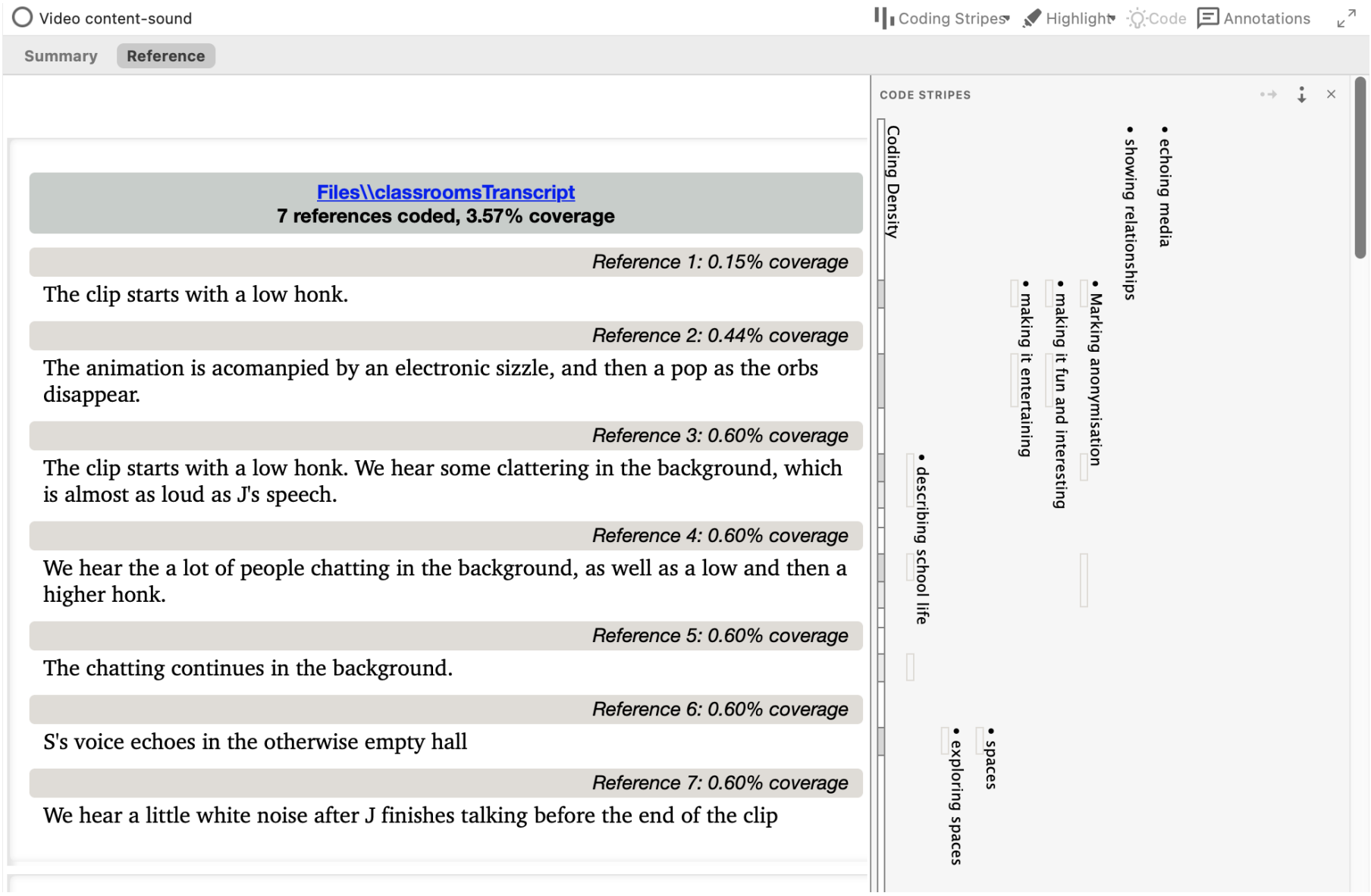
Figure G-19: Tilly's digital story Review

We walked them to the gate, and then went to chat about the session. Frank said he was pleased that they had started to grasp the reflection needed to think critically about their work. I spoke about the choice of the Jamboard, and whether this was a real choice or whether we had not made the other options accessible enough. Frank agreed that this could be what we were seeing, but also spoke through some of the draw of the Jamboards for the students. We chatted about the need for both of us to reflect on this for future sessions.

G.5 Examples of coding modes and meanings from the digital story about classrooms




Filming method
Coding Stripes
Highlight
Code
Annotations
Summary
Reference
Reference 4: 0.60% coverage
The camera zooms in a little, unsteadily. It zooms out a little to show J as he talks. It zooms in and out a few times more to show the playground and the context of J talking to camera.
Reference 5: 0.15% coverage
The camera moves unsteadily to centre S, showing more of the soft play equipment next to her.
Reference 6: 0.60% coverage
The camera wobbles, then zooms out and in, to show more of S's face.
Reference 7: 0.60% coverage
The camera moves to show J's face a he responds, glancing abck to the camera as he does so. The camera wobbles, then zooms out as he talks.
Reference 8: 0.60% coverage
The camera moves slightly back towards S as she responds.
Reference 9: 0.04% coverage
he camera wobbles, unsteadily.
Reference 10: 0.29% coverage
The camera drifts towards S.
Reference 11: 0.31% coverage
The camera moves to the right, to show J responding, and cuts S out the picture. It zooms in on J's face, then zooms out again, and drifts to the right to show more of the hall. It then pans to the left, to show J talking with his hands together, and S, only half in shot.
Reference 12: 0.19% coverage
The camera moves back to J, zooms in sighty, then out again to show S, before floating to the right to show more of the hall just as the clip (and the video) ends.
CODE STRIPES
Coding Density
• directing attention
• exploring spaces
• spaces
• describing school life
• routines
• people
• showing relationships
• representing emotions
• echoing media
• making it entertaining
• making it exciting
• emphasis
• adding stru


Video content-sound
Coding Stripes
Highlight
Code
Annotations
Summary
Reference
Files\\classroomsTranscript
7 references coded, 3.57% coverage
Reference 1: 0.15% coverage
The clip starts with a low honk.
Reference 2: 0.44% coverage
The animation is acomanpied by an electronic sizzle, and then a pop as the orbs disappear.
Reference 3: 0.60% coverage
The clip starts with a low honk. We hear some clattering in the background, which is almost as loud as J's speech.
Reference 4: 0.60% coverage
We hear the a lot of people chatting in the background, as well as a low and then a higher honk.
Reference 5: 0.60% coverage
The chatting continues in the background.
Reference 6: 0.60% coverage
S's voice echoes in the otherwise empty hall
Reference 7: 0.60% coverage
We hear a little white noise after J finishes talking before the end of the clip
CODE STRIPES
Coding Density
• echoing media
• showing relationships
• Marking anonymisation
• making it fun and interesting
• making it entertaining
• describing school life
• spaces
• exploring spaces

G.6 Cross-referencing modes and meanings in the digital story about Classrooms

The following table shows the results from cross-referencing the text coded by meanings and modes. The number in each cell denotes the number of times which each mode and meaning overlapped within the digital story, according to the coding completed during the first stage of analysis.

	1 : Colour	2 : Filming method	3 : Font	4 : Gesture	5 : Music	6 : Speech	7 : Text	8 : Video content-image	9 : Video content-sound	10 : Video effects- animation	11 : Video effects-filters
A : adding structure	0	1	0	1	1	9	0	2	0	0	0
B : describing school life	0	0	0	0	0	6	0	1	3	0	0
C : directing attention	0	12	0	13	0	0	0	21	0	0	0
D : echoing media	0	0	0	0	0	0	0	0	0	0	0
E : emphasis	0	0	0	3	0	0	0	3	0	0	0
F : exploring spaces	0	4	0	6	0	9	1	13	1	0	0
G : making it entertaining	5	0	1	1	10	0	0	2	2	4	5
H : Marking anonymisation	0	0	0	0	0	0	0	0	3	0	0
I : negotiating video direction	0	0	0	0	0	0	0	0	0	0	0
J : people	0	1	0	0	0	0	0	1	0	0	0
K : representing emotions	0	3	0	4	0	3	0	4	0	0	0
L : showing relationships	0	3	0	2	0	3	0	2	0	0	0
M : students views and tastes	0	0	0	0	0	0	0	0	0	0	0