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‘How Can I Use Digital Technologies to Facilitate Cooperative Learning in my Classroom?’ A Self-Study Action Research Project Undertaken During a Global Pandemic

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Declaration

I certify that this research, submitted for the degree of Master of Education, Maynooth University, is entirely my own work, has not been taken from the work of others and has not been submitted in any other university. The work of others, to an extent, has been cited and acknowledged within the text of my work.

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31st August 2021

Abstract

In the 2020-21 academic year, school closures and social distancing requirements had a profound impact on the way in which children learned and teachers taught. This self-study action research project explores how I attempted to address the constraints of a new, restrictive learning environment with an intervention that used digital technologies to facilitate cooperative learning in my 6th class classroom.

Using an array of digital tools including BookCreator, Stop Motion Studio and the full range of apps available on GSuite for Education, the 27 children in my class were asked to work in cooperative groups to complete an open-ended task; one in which they created a character from the future and detailed that character's success in overcoming the challenges of living through a global pandemic.

Schools were closed for the first half of the intervention, while my pregnancy meant that I was forced to facilitate the second half from home. Consequently, the use of digital technologies was inextricably linked with the restrictions of the pandemic, and with all of their accompanying frustrations. Conscious that the intervention could not be examined separately to the context in which it took place, I focused not only on the affordances of digital tools to facilitate the cooperative learning process, but on the significance of the nature of the task and on the impact that the Covid-19 restrictions had on that same process.

Qualitative data was gathered from the written and oral reflections of my students and a group of four critical friends, as well as from my own observations and reflective journal. An analysis of this data led me to conclude that digital technologies could be used to

facilitate cooperative learning by supporting dialogue between group members and by offering a sense of autonomy to students. The motivation that dialogue and autonomy could generate proved especially important in the context of online learning and the socially distant classroom. The negative emotions fuelled by the restrictions of the pandemic were not, however, always counterbalanced by the affordances of digital tools or by the open-ended nature of the task; and children's motivation often suffered due to a perceived lack of autonomy over various elements of the project.

These results have implications for my future practice and, indeed, for policy; suggesting that greater flexibility needs to feature in the classroom and curriculum alike. Importantly, my findings will allow me to live more closely to my values of student voice and autonomy. As I encourage children to express themselves with the aid of digital tools, I will continuously adjust my practice so as to promote a sense of autonomy; and successfully reap the long-proven benefits of cooperative learning.

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List of Abbreviations

CFF: Critical Friends' Feedback

CFGD: Critical Friends' Group Discussion

CR: Children's Reflections

DES: Department of Education and Science

DEIS: Delivering Equality of Opportunity in Schools

IWB: Interactive Whiteboard

RJ: Reflective Journal

SET: Special Education Teacher

SNA: Special Needs Assistant

STAD: Student Teams Achievement Divisions

WCD: Whole Class Discussion

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Chapter 1: Introduction

1.1 Introduction

The Covid-19 pandemic brought with it unprecedented changes on a global scale, with school closures disrupting the education of 91% of students worldwide (O'Keeffe & McNally, 2021). As schools in Ireland prepared to reopen in September 2020, a 'roadmap' was provided by the Department of Education and Skills (2020 b) that gave directions on how to do so safely. This roadmap was accompanied by curriculum guidance (DES, 2020 b), which advised the provision of active learning experiences that would help children to 'reconnect with their classmates and re-form relationships with staff' (DES, 2020 b: 7). Viewed side-by-side, however, it was difficult to see how one set of guidelines could be followed whilst adhering to the other. Accepting that I would have to prioritise health and safety, I quickly began to appreciate that I would not be able to teach using the cooperative pedagogies I favoured.

In this chapter, I detail my struggle with the resulting tension between my practice and my values; my experience of myself as what Jack Whitehead (2009) would call a 'living contradiction.' I recount the impact of this experience on my identity as a teacher, before I return to Whitehead; this time as I explore how my need for hope- for what I call a path that would give me direction through the chaos- could be satisfied through the creation of a living theory. I use extracts from my reflective journal in order to present this introductory chapter in the form of an integrative narrative. Theory is woven through the story of my experience. As I move 'back and forth between individual narrative exposition and theoretical commentary' (Brookfield, 2017: 182), I attempt to make what is deeply

personal a more generalisable insight (Brookfield, 2017) into the challenges of teaching through a global pandemic.

I identify the use of digital technologies as a way of facilitating cooperative learning without forsaking the mandated social distance between students. I outline the appeal and suitability of the action research paradigm, before tracking how my research was forced to evolve; first as schools closed from January to March 2021 and then as it became necessary for me to continue working from home even when they reopened. Finally, I determine both my research questions and the broader purpose and aims of my study, and outline the structure of the thesis and its constituent chapters.

1.2 Covid-19

The closure of all educational institutions from early-years to tertiary levels over a long period was, arguably, ‘one of the most dramatic aspects of the pandemic restrictions’ (Darmody et al, 2020: 68). As a result of the outbreak of Covid-19, Irish primary pupils suffered a loss of direct class contact time from mid-March until the end of June 2020 (DES, 2020). Working in a DEIS school in which the vast majority of students did not speak English at home, I was keenly aware that many of the children in my class could be categorised as the students most likely to be adversely affected by the lack of face-to-face teaching. Guidance from Ireland’s Department of Education and Skills on how to provide the 'necessary supports' for these students (DES, 2020) was issued in July and seemed, at first glance, to be sound and measured. It advised that ‘care should be taken to avoid the overuse of teacher-directed and didactic approaches to teaching and learning in an effort to ‘catch up’ or ‘cover lost ground'’ (DES, 2020: 13). This appeared to be an

acknowledgment of the fact that school ‘fulfils not only an educational mission of knowledge acquisition, but also satisfies the socialisation needs of young people' (Calao et al, 2020: 370). On closer examination, however, the departmental guidance provided was contradictory and confusing.

It was, apparently, ‘essential that, right from the start of the school year, teachers continue to provide a broad range of active learning experiences for all pupils’ (DES, 2020: 13). However, how to facilitate such experiences alongside the health and safety requirements that were also deemed essential was somewhat perplexing. By their nature, these health and safety requirements restricted the active learning advised. Children were to be separated into class bubbles and discrete groups or ‘pods.’ Class bubbles were not to mix. Meanwhile, there was to be a 1m distance between each pod and between individuals within pods. These distances were to be accommodated by removing unnecessary furniture and shelving from the classroom (DES, 2020 b), meaning that my room was stripped of its reading nook, its couches and its cushions. Tables were rearranged in the only formation that allowed for the mandated distances, with children seated at the opposite end of two-seater desks separated into clearly delineated ‘your-space/ my-space’ areas. After all, guidelines stated clearly that workspaces were not to be shared. Contact between students was to be limited and sharing of common facilities and educational materials was to be avoided (DES, 2020b). I would, of course, have to give priority to health and safety. As far as I could see, this meant that I could be tied to the very teacher-led, didactic approach the Department warned against. I knew, instinctively, that the restrictions of the pandemic would prevent me from living in the direction of my educational values.

1.3 Values

Nonetheless, I struggled to articulate what those values were at the beginning of the academic year, landing on the disappointingly generic 'respect, equality and student voice.' On paper, these terms looked clichéd and overused; like something taken from any school website's mission statement. Without transformation into living practice, my values remained too abstract a concept (Raz, 2001) for me to describe. What I *could* describe was my classroom practice. More easily still, I could describe what made me uncomfortable; what made me confused.

> *"My classroom is a noisy one. It always has been. I am comfortable with a healthy buzz of chat and discussion. In fact, when it is silent in my room for too long, I start to feel uneasy. As a general rule, children are not silent by nature.*
>
> *Pre-Covid-19, this buzz was often accompanied by movement. Groups worked together; leaning over each other; sprawled across tables; finding a comfortable spot on the floor upon which to spread their project work or lay out their science investigations. This is no longer possible...and it has made me incredibly confused"* (Reflective Journal (RJ), 5th September 2020).

The pre-pandemic classroom I described was my effort to live in the direction of my ontological values. However, I was making this effort in what Glenn (2006: 53) would call an 'unknowing manner.' My practices were 'outward manifestations of some internal thought processes that were as yet unclear' (Glenn, 2006: 54).

On reflection, it became evident that the playful learning espoused in the Froebelian philosophy I studied while training to become a teacher had continued to influence my practice; and that this influence had persisted beyond a move from infants to the senior end of the school, translating to a focus on open-ended cooperative learning. The 'buzz' documented in that early journal entry pointed to a desire to create a dialogic environment in which the children were 'able freely to listen to each other, without prejudice' (Bohm, 2004: 3), while the freedom in the children's movement and the cooperative learning described could be traced back to Dewey's (1916, as cited in Baroutsis et al 2016) notion of children as 'active and engaged citizens.' Froebel would suggest that, without the freedom of play, a child is merely following a task prescribed for him by another and, as such, 'does not reveal his own creativeness and inclination but another's' (Bruce, 2020: 39). My concept of 'student voice,' I realised, was tied up with this idea of freedom; and I revised my understanding of my educational values, listing them as *student voice and autonomy.*

Like Froebel, I rejected the idea that the function of school is to teach isolated facts (Bruce, 2020). So, too, did I reject the notion of 'students as blank slates, teachers as sole authors of what students learn, schools as sorting machines and education as banking' (Cook-Sather, 2002: 5). My epistemological stance was that knowledge was uncertain and ambiguous; that it was created, not discovered (McNiff & Whitehead, 2006) and that it could be constructed through pedagogies that encouraged 'open exchanges of ideas, engagement with multiple voices and perspectives and respectful classroom relations' (Howe and Mercer, 2017: 83). Cooperative learning was one such pedagogy.

According to Brookfield (2017: 1), every good teacher wants to change the world for the better; to 'help students act toward each other, and to their environment, with compassion, understanding and fairness.' To do so, I felt that I needed to provide opportunities for authentic cooperative learning; subscribing to a belief that 'meaningful learning is based on more than what teachers transmit;' that, instead, it 'promotes the construction of knowledge out of learners' experience, feelings and exchanges with other learners' (Sharan, 2015: 83).

Covid-19 had the potential to prevent all of this.

1.4 A Living Contradiction

In a world so completely upended by the pandemic, it was almost predictable that I would begin to experience a sense of dissonance between my values and my practice. The need for social distancing had the potential to validate didactic, content-led teaching. This had left me with a crippling sense of self-doubt, and I wondered

> *'Do I even have the ability to function as a stand-at-the-board and sit-at-my-desk teacher? More importantly, do I have the will?'* (RJ, 5th September 2020)

With no sense of how I could live to my values in the context of Covid, I found myself floundering. I was experiencing myself as a 'living contradiction' (Whitehead, 2009). The values to which I ascribed and committed as a teacher were being denied in my practice. There was, after all, a new rigidity to my timetable required to avoid the mixing of class bubbles.

> *"I have so many alarms set on my phone to keep me on schedule that the children can sing along to their melody….which, of course, I have to shut down as soon as it starts. There is no singing allowed.*
>
> *I miss singing so much"* (RJ, 20th November 2020).

This rigid timetable was at odds with my values. 'Without a sense of agency,' writes Maxine Greene (2016: 139), 'young people are unlikely to pose significant questions, the existentially rooted questions in which learning begins.' I felt that I was playing a part in taking that agency away from the children in my class. Far from the usual, welcome 'messiness' of my pre-Covid classroom practice, in which lessons often spiralled in unforeseen directions, pulled there by enquiry, conversation and interaction, school with social distancing in place seemed regimented and unfamiliar. Children filed out of the classroom with military precision, stopping only to sanitise; a sight initially so alien that I described it as *"almost a little creepy"* (RJ, 30th August 2020). Rather than an educator, I felt like a prison officer; a prison officer who was enforcing rules that seemed counterintuitive and wrong.

The environmental obstacles (Hoekstra & Korthagen, 2011) were not ones that could be overcome, and were making me behave in a way that was both unfamiliar and uncomfortable. I was not, for example, supposed to let the children share. The new learning environment was not conducive to my preferred pedagogies, which I identified as active, constructivist and dialogic, and which gave primacy to collaboration and cooperation. An ideal cooperative learning environment allows children to 'exchange ideas in a comfortable atmosphere' (Johnson et al, 1994: 39). The mandated 1 metre distance

between children made the exchange of ideas more difficult, while the strangeness of adhering to these rules was a distinct barrier to a ‘comfortable atmosphere.’

It was this very dissonance- my experience of myself as a living contradiction- that forced me to take action. Uneasy with the tension between my values and my practice, I found ways to allow the children to cooperate in a digital space. Here, the children could harness the ‘full power of information and communications technologies for individual and collective expression, experience, and interpretation’ (Dede, 2010: 4). Cooperative learning and its accompanying interaction and dialogue could continue. Indeed, it was the discomfort of the dissonance I was experiencing that led me to settle on a final question for my action research: ‘How Can I Use Digital Technologies to Facilitate Cooperative Learning?’

1.5 Teacher Identity

However, the impact of Covid on my sense of identity ran deeper than mere discomfort. My professional knowledge of what was ‘best’ had been completely undermined (Delaney, 2015). I could accept that ‘identity is not a concrete, stable thing'; that it is 'constantly in motion’ (Buchanan, 2015: 704). But I was losing my sense of professional identity altogether, witnessing it disappear alongside the agency I needed to adequately meet the needs of my students.

Kelchtermans (2018: 30) suggests that there are five components that make up teachers’ self-understanding: self-image, self-esteem, task perception, job motivation and future perspective. Over my ten years in the profession, I had carefully constructed a self-image

of a caring teacher who encouraged expression and creativity in the classroom. I did not feel like that person anymore and my self-esteem had plummeted as a result. My task perception- my concept of what I must do to be a 'proper teacher' (Kelchtermans, 2018: 231)- had been skewed. In any year, teaching is not 'a neutral, technical endeavor, but implies value-laden choices, moral considerations, and ethical stances' (Kelchtermans, 2018: 230). This year, I was in a moral dilemma. The Department's 'Schools are Safe' mantra only applied when mitigation measures were in place, and one of those measures was that I should be staying two metres away from the children. This was simply not possible, which caused me to question myself:

> *"Am I getting lax? Is this going to lead to outbreaks? Will I be responsible?"*(RJ, 16th November 2020)

My job motivation was being slowly eroded

> *"I am trying to be cheerful and positive for the children, but I feel like I have nothing left to give"* (RJ, 21st October 2020)

while my future perspective had become blurred and indistinct. I could not make plans for the weekend, let alone form expectations about my future in the job. The uncertainty of the pandemic had coupled with a new, professional uncertainty that had fractured my self-understanding; leaving me confused, insecure and overwhelmed.

My vulnerability as a professional stemmed from a feeling of powerlessness; from a lack of direct control over factors that affected my immediate context (Lasky, 2005). And the

day-to-day emotional labour of the job was more difficult without my usual support systems in place:

> *'I am exhausted from feeling so responsible all of the time. I want to be minded. I want a hug from my mum!'* (RJ, 25th November 2020)

Without a chance to recharge, I was running on empty.

1.6 Hope

I needed hope. After all, the very premise upon which education is built is the hope that teaching and learning will lead to improvement (Halpin, 2003). Given that the yearning hope to do well as a teacher is often 'allied to a propensity to innovate in order to achieve one's ends' (Halpin, 2003: 16), it is unsurprising that the restrictions of Covid had caused my hope to waver. I was all-too-aware that I should not waste my energy in the hopeful pursuit of something that was clearly a lost cause (Halpin, 2003). I knew that I would not see a return to my pre-Covid classroom practice until the pandemic had passed. From the beginning, I was concerned that this could lead to a certain fatalism; a 'What can you do?'; 'It's just the way things are' attitude (Halpin, 2003: 21). As the year progressed, uncertainty was feeding this fatalism. I genuinely didn't know what I *could* do.

My research provided a path that gave me direction through the chaos; a way to 'ward off the felt dangers of ambiguity' (Boler, 1999: 214). A self-study approach, meanwhile, allowed me to avoid oversimplification and rigidity. I could learn to willingly 'inhabit a more ambiguous and flexible sense of self' (Boler, 1999: 214); adopting a pedagogy of

discomfort that would turn my reflections from mere 'liberal navel-gazing' to a potentially transformative process of scrutiny (Boler, 1999). This brought me comfort. My research question was primarily formulated to solve a practical issue: how could children work together when health and safety required them to stay apart? In taking pragmatic steps to address this question, I could rediscover the 'joy' that was missing from my experience of teaching this year. Without the usual level of interaction in my classroom, there was a certain reward that was missing from that experience. I needed validation from elsewhere.

I turned to my own research for this validation, the prospect of which offered me the hope I had been missing. The appeal of the action research paradigm was about more than the action I could take as a practitioner. Action research prioritises the link between theory and practice, promoting the practitioner as a knowledgeable, competent theorist (McNiff & Whitehead, 2006). Elevated as such, I reasoned, I could experience a professional pride that would return the self-efficacy I was so missing.

1.7 Action Research: An Evolutionary Process

My concerns about social distancing were soon to be overshadowed. Schools across the country closed from January to March 2021, with digital learning platforms taking the place of traditional classrooms. This inevitably made cooperative learning considerably more difficult, with the children's interactions becoming less natural as we moved online. However, the move to online learning promoted the role of digital tools in cooperative learning from complementary to *essential*. Content had to be delivered through technology and all interactions became reliant on it, while group activities depended upon online tools (UNESCO, 2020).

The children returned to school in March. I did not. In the first trimester of pregnancy, departmental guidelines (DES, 2021) stated that I must continue working from home. I did not know how to feel about this. Journal entries revealed an inner conflict:

> *"There is a reason I don't have an office job. I miss the interaction of the classroom. I miss the noise!*
>
> *That said, if the Department is concerned enough to keep pregnant women out of schools, I am concerned enough to be relieved"* (RJ, 10th March 2021).

All of a sudden, the action research I had identified as a life buoy seemed to offer less solace. It had evolved. The children no longer had to rely upon technology for all interaction and communication, but I did. While my replacement teacher was happy to support the intervention in class as I facilitated it from home, I could not help but wonder

> *"Is this true practitioner research or have I been relegated to the position of an outsider?"* (RJ, 12th March 2021)

Monitoring the children's progress would be a challenge when I could not be physically present. However, I had to remember that action research is never linear. The evolution of the project to meet these new contextual demands would, in itself, provide interesting insights into the benefits and limitations of technology as a tool to facilitate cooperative learning. Perhaps I would not be able to draw neat, tidy conclusions, but that was not the purpose of my research.

1.8 Purpose and Aims of the Study

The broad aims of this study could instead be summarised as follows:

- To realign my practice with my values, and gain new understanding about those values and their influence.
- To question my prior knowledge, values and experience in order to make justified pedagogical decisions, with a resulting positive effect on teaching and learning (Cooney, 2012).
- To generate a living theory about how my learning has improved my practice and is informing new practices (Whitehead and McNiff, 2006).

The study was designed to address what O'Donoghue (2007: xi) calls the 'cognitive dissonance' I was experiencing in a classroom bound to necessary safety measures during a global pandemic. An intervention was implemented in response, in an effort to realign my practice with my values. As I monitored what happened as a result of my actions, I would reflect on what I was learning and use the new knowledge gained to contribute to improvement on a practical, personal and theoretical level (Sullivan et al, 2016).

I composed my research question carefully, so that it began with *'How can I…?*' This was significant. I did not want my ideas to remain on a page, lifeless, because they did not make 'the real-world link with action' (Whitehead and McNiff, 2006: 13). I wanted the ideas generated to be personal, *living* theories. After all, as Tina Bruce (2020: 52) puts it, 'dead theory, unrelated to practice, is probably a waste of time.' Following the Froebelian tradition, I planned to 'observe, then support and extend' (Bruce, 2020: 50). Sub-questions

were designed to provide a fuller understanding of the various elements that influence the cooperative learning process, as shown in Table 1.

Research Question	How can I use digital technologies to facilitate cooperative learning in my classroom?
Sub-Questions	How does the nature of the task affect the cooperative learning process?
	How do the restrictions of the pandemic impact cooperative learning?
	How can digital tools be used to enhance the cooperative learning process?

Table 1: *Research Questions*

Importantly, however, this study did not restrict itself to the investigation of 'what works' at a classroom level. Rather, it sought to identify problems and to problematise what was not seen as a problem (Biesta et al, 2019). It aimed to 'change mindsets and common perceptions...to expose hidden assumptions, and...to engage in ongoing conversations about what [was] valuable and worthwhile in education' (Biesta et al, 2019: 3). The potential this study offered for empowerment and change meant that it would have what Beth Cooney (2016: 89) calls 'a protective effect against deprofessionalisation and demotivation.' In a situation where I felt powerless, this study aimed to give me a voice; to remind me that, as a practising professional, I was in a unique position to 'make visible the way that students and teachers together construct knowledge and curriculum' (Cochran-Smyth & Lytle, 1993: 43, as cited in Cooney, 2016: 78).

1.9 Organisation of the Thesis

This study is organised according to the steps involved in an action enquiry as outlined by McNiff and Whitehead (2006).

- I identify a concern that involves the denial of my educational values in my practice
- I offer examples that show how these educational values are being denied
- I imagine and implement a solution to the situation
- I evaluate the outcomes of the implemented solution and, finally,
- I modify my practice in light of the outcomes of the implemented solution (Roche, 2007: 11)

The five chapters of my thesis correspond to each of the bullet points above. In this, the first, I have outlined my concern that social distancing had the potential to validate didactic, content-led teaching. Examples that show how my educational values were being denied illustrate my experience of myself as a living contradiction (Whitehead & McNiff, 2006). Chapter 2 consists of a review of the literature surrounding my research question; a review that allowed me to deepen my knowledge, conceptualise my thinking and imagine a solution to the situation. Following an explanation of my choice of methodology, Chapter 3 details the implementation of that 'solution,' the research procedure and how I ensured accuracy in my conclusions and validity in my account of learning. The outcomes of my intervention are evaluated in Chapter 4, while the subsequent modifications to my practice and the significance of my work are discussed as part of my conclusion in Chapter 5. Throughout, I engage with relevant literature so that my study becomes a 'combination of theory, reason and research' conducted in a 'systematic and methodologically rigorous way' (Cooney, 2016: 7).

Chapter 2: Literature Review

2.1 Introduction

Extensive research studies validate cooperative learning as an effective pedagogy for young children and provide methods, models and procedures for practitioners to follow and adapt (Sharan, 2014). In contrast, digital technologies have yet to show any deep impact on education (OECD, 2016), and are often used merely as a means of increasing the effectiveness of traditional, instructional approaches (Dede, 2010). My literature review explores both of these areas in three distinct sections. In the first, I explore cooperative learning, discussing the essential elements and structures required to ensure its success. I question the role of digital tools in the classroom in the second section, and suggest that cooperative learning is an appropriate base pedagogy upon which to build a learner-centred approach to using technology. In the third and final section, I outline the affordances of digital technologies to facilitate cooperative learning. I focus on the positive impact that these technologies can have on dialogue and interaction and, vitally, how a focus on pedagogy has proven to be particularly important in the context of a global pandemic that has promoted the use of technology in schools to a necessity overnight.

2.2 Cooperative Learning

At a basic level, cooperative learning can be understood as the learning that takes place within a small group of interdependent students. Each student is required to complete their part of the work and to ensure that others do likewise (Gillies, 2003). As such, each group member takes responsibility for the progress and achievements of the team. Importantly, it

is through interaction with others that ‘students learn to inquire, share ideas, clarify differences and construct new understandings’ (Frykedal & Chiriac, 2014: 222).

2.2.1 Essential Elements of Cooperative Learning

The five key features of successful cooperative learning identified by Johnson & Johnson (1999) can be listed as

- positive interdependence
- individual accountability
- promotive interaction
- the appropriate use of social skills and
- group processing

Positive interdependence exists when students perceive that they cannot experience success unless the others in the group do too (Gillies, 2003). Positive interdependence leads to a perception of entitativity- of unity and coherence- that can help children feel accountable for their efforts (Johnson & Johnson, 2009). A sense of commitment to the others can add the concept of ‘ought’ to group members’ motivation; a feeling that ‘one ought to do one’s part, pull one’s weight, contribute and satisfy peer norms’ (Johnson & Johnson, 2009: 368). Nonetheless, it is essential that each child’s contribution to the group’s goal is identifiable in order to ensure *individual accountability*. *Promotive interaction* is evident when students are giving others the help they need to achieve the group task. This help could simply be the sharing of materials. It could be the provision of explanations, information or constructive feedback. Alternatively, a student could help another group member by challenging their reasoning or conclusions. This is classified as

'help' because that challenge offers the group a chance to explore alternative points of view and can lead to higher quality decision making and greater creativity (Johnson & Johnson, 2009).

Effective promotive interaction is obviously dependent on the *appropriate use of social skills* and these are something that must be explicitly taught and consistently reinforced. Children need to communicate accurately and unambiguously in order to support each other and establish a sense of trust and acceptance within the group (Johnson & Johnson, 2009). Gillies (2003) suggests that effective communication is facilitated by children who are able to actively listen to each other during group discussions, consider the perspective of others and provide constructive feedback. Their teammates must feel comfortable to state ideas freely without fear of derogatory comments, but the stresses and strains of working together productively (Johnson & Johnson, 2009) mean that differences of opinion are almost inevitable and children must also know how to resolve conflicts when they arise. So, too, must they know how to take responsibility for their own behaviour (Gillies, 2003). Other small group skills that must be explicitly taught include turn-taking, equitable division of tasks and democratic decision-making processes (Gillies, 2003). Armed with these skills, the last essential element of successful cooperative learning, *group processing*, becomes a whole lot easier. Group processing requires students to reflect on their progress and on their working relationships (Gillies, 2016) and to identify, define and solve problems that the group is having working together effectively (Johnson & Johnson, 1999).

An understanding of these five essential elements of cooperative learning allows teachers to adapt the pedagogy to suit the specific needs of their individual context and students

(Johnson & Johnson, 1999). When doing so, there are a number of factors that should be considered.

2.2.2 Structuring Cooperative Learning

A teacher must specify objectives for the lesson, explaining the task and goal structure to the students. Once the cooperative lesson has been set in motion, the teacher must monitor the effectiveness of the groups and intervene as necessary, before evaluating the students' achievement and helping them to discuss how well they collaborated with each other (Johnson et al, 1994). There are also a number of pre-instructional decisions (Johnson & Johnson, 2013) that need to be made regarding the nature of the task, the composition of the group and the model of cooperative learning used.

Task

Cohen's 1994 study on productive small groups focuses on tasks and interaction in an attempt to shed light on the conditions required for cooperative learning to be effective. Importantly, she notes the need to define productivity. Most commonly, productivity in schools is understood as the conventional academic achievement that can be measured in standardised tests. This still holds true today, 27 years after this research was undertaken. However, a productive small group can also be defined as one that engages in high-level discourse or desirable prosocial behaviours. Furthermore, productivity can be defined in terms of equity and found in a group that engages in equal-status interactions (Cohen, 1994). With an appropriate task, cooperative learning activities should encourage all definitions of productivity. A truly group-worthy task is one that is 'sufficiently open-

ended and multi-faceted to require and benefit from the participation of each member of the group' (Barron & Darling-Hammond, 2010: 212). When a task is well structured, there is often no need to discuss how to proceed. There is only a need to find the right answer (Gillies, 2003). In contrast, ill-structured problems with no single, correct answer necessitate interaction (Cohen, 1994) and facilitate the sort of exploratory talk that allows children to build upon each other's ideas critically and constructively (Grau et al, 2018). Task related interactions have been found to impact positively on computational and conceptual development (Cohen et al 1989) and to aid the development of higher order thinking skills (Gillies & Ashman, 1998). The teacher's role in facilitating these task interactions is key. King (1991, 1994) has shown that guided questioning can help students to become strategic problem-solvers and that young children can be trained to generate their own experience-based questions that allow them to engage in complex knowledge construction. From a teacher's perspective, this demands the creation of scaffolds, including tasks that are structured in such a way that students understand the objectives of the lesson (Johnson & Johnson, 1994). Sharan (2010) supplies some basic guidelines for this structure. A teacher must provide

1. A clearly stated group goal
2. Directions that activate positive interdependence
3. Guidance on the expectations for social interactions and communication and
4. Clear criteria for success

The centrality of task design means that activities should be constructed with 'judicious adherence' (Sharan, 2010: 309) to the guidelines above and coupled with reflective practice that aims to improve the contributions of student and teacher alike.

Group composition

The nature of the task interacts with the composition of the group to impact learning. Noddings (1989, as cited in Lou et al, 1996) notes that heterogeneous groups can be counterproductive in typical academic tasks. Group members can tend to rely on the most able student, minimising interaction, engagement and understanding even if they appear to get the correct answer. However, taking instead the notion of a 'group-worthy task' as outlined above, the impact of mixed-ability groups on learning outcomes is quite different. Students with lower ability benefit from working with more able peers, while high ability students work equally well in heterogeneous and homogeneous groups. Interestingly, medium ability students appear to benefit most from homogeneous groups (Lou et al, 1996), perhaps due to being excluded from the teacher-learner relationships that develop between students of high and low ability (Gillies, 2003). Groups need to be small enough to make sure that all members are visible and involved, with an optimal size of three to four students (Lou et al, 1996). A group that is too large can prove to simply replicate the conditions of whole-class instruction in which knowledge is transmitted rather than constructed (Gillies, 2016). It can also damage the cohesion of the group, with members placing less significance on their personal contributions (Johnson & Johnson, 2009). A lack of individual accountability can lead not only to less communication within the group, but to less *truthful* communication, with members tempted to alter their statements to 'conform to the perceived beliefs of the overall group' (Johnson & Johnson, 2009: 368).

Gillies (2003) would describe the effect of gender composition on group interaction as 'less clear.' However, in acknowledging the importance of interactions, I simultaneously acknowledge the importance of diverse perspectives in a group; trusting that 'different interests, backgrounds, values and abilities of group members enrich the class' pool for

expanding knowledge' (Sharan, 2014: 807). Mixed-gender groups are therefore preferable. What *is* definitively clear from existing research is the necessity of laying the groundwork for appropriate social interaction and cooperative behaviours. In order to experience success, groups need to be given *training* to facilitate interactions and *time* to become more responsive to each other's needs (Gillies, 2003). The amount of training the children have had and the amount of time they have spent together will influence which model of cooperative learning is chosen or adapted by a teacher.

Choosing a Model

The most researched models for cooperative learning can be divided into three categories:

1. Models that emphasise motivation and the mastery of concepts
2. Models that emphasise communication and social skills and
3. Models that incorporate all of these skills as well as emphasising intellectual inquiry and equal status interactions (Sharan, 2015).

1. An Emphasis on Motivation & Mastery of Concepts

The first category is perhaps most applicable to methodologies such as Robert Slavin's Student Teams-Achievement Divisions (STAD), which aim to teach well-defined objectives (Slavin, 2010). However, there are established models in each category that are applicable to open-ended tasks and incorporate the social dynamics that an ill-structured assignment demands. *Jigsaw,* for example, requires children to learn about a certain section of the academic material under study in expert teams. They must then return to their original group to present what they have discovered (Sharan, 2014). The synthesis of

everybody's contributions is the group goal, which can only be achieved by listening carefully to the explanations of each member (Slavin, 2010). While suited to open-ended tasks, this model could certainly be categorised as one that emphasises motivation and the mastery of concepts.

2. An Emphasis on Communication and Social Skills

Meanwhile, Johnson and Johnson's *Learning Together* finds its roots in Deutsch's theory of interdependence and is a prime example of a model that prioritises communication and social interaction (Sharan, 2015). The five essential elements for effective cooperative learning previously discussed are central to this approach, in which students assume procedural roles such as facilitator, timekeeper and recorder in order to create group interdependence (Sharan, 2014).

3. An Emphasis on Intellectual Inquiry and Equal Status Interactions

The third category includes *Complex Instruction* and *Group Investigation*. Both of these models rely heavily on the nature of the task, which must be challenging and open-ended enough to be group-worthy. Complex Instruction focuses on status characteristics and interaction and uses strategies to 'bolster the status of infrequent contributors' (Barron & Darling-Hammond, 2010: 212). In this approach, a multi-faceted problem is presented by the teacher. *Group Investigation,* meanwhile, requires the children to construct the problem themselves by raising their own questions about the topic (Sharan, 2014).

Rather than being mutually exclusive, Sharan (2014: 803) suggests that these methods and models 'can be seen as constituting a continuum based on the degrees of independence they afford group members in choosing what and how they will learn and the concomitant degrees of structure and direction the teacher has to provide.' And while he calls the modification of procedures 'welcome evidence of teachers' autonomy and creativity' (2010: 304), he warns against creating one's own version if the basic principles of cooperative learning have not yet been internalised. Only if they have can a teacher hope to begin the complex task of coordinating the requirements of an adapted procedure with the variables of their classroom. In any context, these variables include students' interpersonal skills and readiness to assume responsibility for their learning (Sharan, 2010) and the teacher's ability to provide structure and relinquish control as necessary. In the 21st century, the availability of technology adds at least another variable to that list.

2.3 Digital Technologies in the 21st Century Classroom

2.3.1 Digital Technologies

While digital technologies are widely recognised to provide the necessary tools for improving the teaching and learning process (Pedró, 2010), the impact they have had on education has been shallow (OECD, 2016). Research has consistently had difficulty in providing convincing evidence of the impact of ICT on student performance (Voogt & Pelgrum, 2005) and has found weak and sometimes even negative associations between the use of technology in schools and traditional achievement (OECD, 2016). This is because the potential of technology in education remains underexploited (Lawlor et al, 2010), with schools and education systems not ready to leverage its promise (OECD, 2016). Despite significant investment in digital resources, the teaching and learning environment remains

far from revolutionised (Dumont et al, 2010). This is, perhaps, even more disappointing against the backdrop of the rapid development of technology itself. After all, 'when fast gets really fast, being slow to adapt makes us really slow' (Schleicher, 2019: 56).

Most teachers are convinced of the benefits that ICT can bring to the classroom. Across the OECD countries, most educators have access to the necessary technology and have the necessary baseline skills (Pedró, 2010). Still, the transformative power of ICT remains, to a large degree, untapped. Pedró (2010) accounts for this paradox, summarising the potential reasons that have been put forward by various researchers: Teachers do not receive adequate *training*, with teacher training institutions largely missing out on their chance to avail of showcasing opportunities for the innovative use of technology in education. When qualified, teachers consistently cite a need for professional development in using ICT for teaching (Burns & Gottschalk, 2019), but are not rewarded for the effort of pedagogical change or supported with any clear *incentives*. The scarcity of research that can link the use of technology to quality, equity and student performance does not help. A clear *knowledge base* is required so that teachers can understand what works and adjust their practice accordingly (Pedró, 2010). These issues mean that innovative pedagogical practices supported by technology are often based only on what Voogt et al (2013) call 'personal heroism'; on highly motivated pioneers who experience a 'dissatisfaction with the status quo' (Demetriadis, 2003: 22).

The successful integration of ICT is hindered by an 'era of accountability' (Buchanan, 2015) that tightly regulates teachers' work and roles. A focus on traditional, easily-quantified notions of 'achievement' is, arguably, the current status quo. This can result in technology being used merely to support traditional skill-and-fact orientated instructions

and serve to dissuade teachers from regularly using technology in their classrooms (Lim & Chai, 2008). These skill-and-fact orientated instructions are not, however, an appropriate pedagogical approach for 21st century learners.

It is important to draw a distinction between technology-centred and learner-centred approaches to learning with technology. A technology-centred approach works on the assumption that learners and teachers will adapt to the requirements of the new technology (Mayer, 2010). This approach has often resulted in predictions about the positive impact of educational technology that fail to materialise. In contrast, a learner-centred approach begins with a focus on how people learn; viewing technology as an aid to human learning rather than a fix-all solution to the complexities of teaching (Mayer, 2010). Like previous innovations, ICT can be 'assimilated to pedagogical practice without altering the fundamental truths about how people learn' (Beetham & Sharpe, 2013: 4). As Chris Dede puts it, 'technology is not a `vitamin' whose mere presence in schools catalyses better educational outcomes' (Dede, 2000: 282). More simply, 'technology can amplify great teaching, but great technology cannot replace poor teaching' (OECD, 2015: 4).

It is when used in conjunction with an appropriate pedagogy that ICT has the potential to develop complex cognitive skills (Voogt & Pelgrum 2005) and help to shape essential competencies necessary for life today and in the future (Voogt et al, 2013).

2.3.2 Cooperative Learning and Digital Technologies: Making the Links

In his 2018 Research Review, Louis Volante (2018: 7) suggests a working definition for effective pedagogy that takes the demands of contemporary society into account: Effective pedagogy can be understood as 'instructional techniques and strategies that enable 21st

century learning such as creativity, critical thinking, problem-solving, collaboration and digital literacy to take place.' Cooperative learning is one such pedagogy.

Highly effective digital practice requires a focus on pedagogy before technology, with new technologies located within proven practices and models of teaching (Beetham & Sharpe, 2013). Countless studies prove the effectiveness of cooperative learning as a pedagogy that improves both traditional and socio-emotional outcomes (Gillies, 2016). If digital technologies are used as a tool to support this established pedagogy, one of the barriers to successful integration of ICT earlier identified- *a clear knowledge base* (Pedró, 2010)- is immediately dismantled. A clear knowledge base for cooperative learning exists. Digital technologies are simply a catalyst for its long-proven benefits. Cooperative learning, in this era of rapid change and ubiquitous technology, has not become redundant. Rather, it has become an essential tool for training individuals in how to meet the major challenges of the 21st century (Johnson & Johnson, 2014: 844).

In the classroom, ICT can be used to enhance interactivity in a number of ways (Beauchamp, 2011). It can function as a *Passive Tool for Interaction*; a means through which a teacher can demonstrate or model a task. It can be the *Object of Interaction*, acting as a resource to interact *about*. It can be a *Participant in Interaction*; becoming a partner to interact *with*. Finally, it can be an *Active Tool for Interaction*; a medium to interact *through.* Ultimately, however, its role is not important in its own right. Rather, ICT is a mediating resource that can facilitate a wide range of interactions if used appropriately (Beauchamp, 2011); interactions that are essential to successful cooperative learning. Effective use of digital technologies needs to be grounded in an established pedagogy, but so too can an established pedagogy be enhanced by the potential of ICT.

2.4 Using Digital Tools to Facilitate Cooperative Learning

2.4.1 Affordances of ICT in the Cooperative Classroom

There is a significant overlap between the potential of technology to facilitate classroom dialogue and its potential to facilitate cooperative learning. Digital technologies have a positive impact on dialogic activity because they expose students to alternative perspectives. For example, technology-mediated discussion can involve a prompt, such as a Tweet, that challenges or reinforces children's point of view and encourages metacognition (Major et al, 2018). It follows that digital technologies should have a positive influence on cooperative learning. If this prompt is used within a cooperative learning group, after all, it can be used to facilitate promotive interaction, appropriate social skills and, indeed, group processing.

The ability to co-construct a 'truly shared digital artefact' (Major et al, 2018) gives scope to the possibilities of an open-ended task, allowing children to co-construct knowledge with purpose. Pifarré & Kleine Staarman's research on collaborative learning in primary education (2011) focuses on wikis as a tool to create dialogic space for thinking together. They note how wiki software enables the collaborative editing of texts, allowing users to create content and hyperlink it to further content. This functionality is not, of course, limited to wikis. Using technology to create 'negotiation spaces' (Pifarré & Kleine Staarman, 2011), students can brainstorm, exchange opinions, make decisions, coordinate activities and revisit and reflect upon ideas (Lau et al, 2017). Contributions to these negotiation spaces can be considered both fluid and transitory, which helps to build students' confidence and increases their likelihood to add suggestions (Major et al, 2018). An increased number of suggestions promotes shared cognition and allows students to be

exposed to a wide range of perspectives. The ability to present contributions in new and interesting ways and to share this content easily with a wide audience has also been found to have positive effects on classroom dialogue. Meanwhile, access to all previous and current work in a shared, digital space not only facilitates continuity between lessons, but gives students a chance to move back as well as forward; to add to the construction of ideas and knowledge over time and guide their own learning (Major et al, 2018). Teachers can simultaneously trace and monitor the evolution of the children's ideas, providing instant formative feedback and elaborating, correcting and questioning as necessary (Major et al, 2018).

Physical groupings remain important and sharing devices can avoid the 'retreat to a lone learner' situation that can occur when each child has access to their own (Lawlor et al, 2018). Importantly, however, technology also allows children to form social ties with one another even when geographically separated (Lau et al, 2017), with cloud computing applications such as those available in Google's 'GSuite for Education' found to facilitate communication and collaboration, assisting both independent learning at home and peer-to-peer learning (Lim et al, 2015).

The affordances of digital tools to facilitate dialogue suggests that their impact on the cooperative learning process could be similarly positive; that teachers simply need to be attuned to the affordances of a technology's features, and make a direct link to pedagogy in order to ensure that its potential is actualised (Major et al, 2018).

2.4.2 Pedagogy and the Use of Digital Tools During the Covid-19 Pandemic

Pedagogical practices that supported 'development of key twenty-first century skills such as collaboration, project work, creativity, critical thinking and self-direction' (Bray et al, 2021: 7) were found to ward against student disengagement during the 2020 school closures in Ireland. Primary students reported that they particularly enjoyed project and practical work and technology-related activities (Flynn et al, 2021: 3). A focus on pedagogy was key, as the biggest barrier to learning during these closures was identified as a lack of interest from the student (Bray et al, 2021). An overnight shift to online learning may have been termed a 'panacea for the crisis' (Dhawan, 2020), but it was a move into unchartered territory where there were no guidelines and where much of what worked in person did not work online (Winter et al, 2021: 2). Educators and learners were forced to adapt with little or no other alternatives available, meaning that the use of suitable and relevant pedagogy depended on 'the expertise and exposure to information and communications technology for both educators and the learners' (Pokhrel & Chhetri, 2021: 135). Indeed, Scully et al (2021: 178) found that 'teachers' lack of proficiency in appropriate pedagogic approaches to support technology-based teaching and learning emerged as a notable impediment to the continuity of teaching and learning during the closures.'

Children reported that they missed social interaction and time with friends, prompting Flynn et al (2021: 6) to suggest that proactively reimagining opportunities for meaningful online connection among students is a priority when learning from home. The need for innovative means of simulating socio-collaborative contexts (Flynn et al, 2021: 1) was clear after a period in which many students' experience of online learning was

asynchronous. After all, the vicarious interaction that occurs during asynchronous learning 'when a learner absorbs and processes an observed interaction between others' (Sutton, 2001: 227) did not always actively support students' needs for relatedness, 'which Self-Determination Theory (Ryan & Deci, 2000) considers to be a universal basic need for psychological wellbeing and optimal functioning' (Flynn et al, 2021: 7). Perhaps the more explicit mutual goal and common purpose of a cooperative learning activity was necessary in order for an online environment to act as a setting that served to 'supplement face-to-face relationships' (Johnson & Johnson, 2014: 849).

While the logistical difficulties of working in groups are recognised as 'harder to resolve' in an online environment (Smith et al, 2011: 127), it is clear that the use of digital tools to facilitate cooperative learning could serve to 'humanize the learning process' (Dhawan, 2020: 9); to provide the 'connection before content' (Bray et al, 2021) that was missing during the 2020 school closures. In a socially distant classroom, meanwhile, this approach could 'avoid techno-centrism whereby technology use is promoted and adopted in the absence of meaningful pedagogy' (Scully et al, 2021: 159). Importantly, the forced engagement with remote provision has increased teacher readiness to engage with digital technologies (Scully et al, 2021) and, simultaneously, given students new skill sets that should make a move to a more learner-centred approach to learning with technology eminently possible.

2.5 Conclusion

I have presented cooperative learning as a pedagogy appropriate to the demands of the 21st century. Used in tandem with digital technologies, it becomes even more relevant to a complex, globalised society and to students who must be prepared to 'overcome the unforeseen challenges of tomorrow' (Schleicher, 2011: 2). Digital technologies have been shown to facilitate the interaction and dialogue essential to successful cooperative learning. Importantly, the necessity of using technology during the 2020 school closures means that it is 'no longer scary' (Scully et al, 2021: 179); that its potential to 'transform the student learning experience' (Scully et al, 2021: 159) is ready to be untapped, with teachers and students alike primed to explore the affordances of digital technologies to facilitate cooperative learning.

Cooperative learning is a pedagogy that can teach the life skills of 'listening, respecting the viewpoint of others, communicating effectively, resolving conflicts and working together to achieve a common goal' (Kirk, 2005: 8) If adapted to utilise the affordances of digital technologies, it has the potential to do so even when children are at a social or geographical distance from their teammates.

My research aims to explore that potential.

Chapter 3: Research Methodology

3.1 Introduction

This chapter outlines my choice of methodology, placing my enquiry in the action research paradigm. I offer an explanation behind this choice, before detailing how the structure of my methodological approach gave shape to my subsequent actions. The ethical considerations that were taken into account during data collection are discussed, while my research procedure is broken down into two action-reflection cycles. I recount how I went about the thematic analysis of my data and, finally, how I decided upon the criteria and standards of judgement against which to measure my contribution to both practice and knowledge (McNiff & Whitehead, 2006).

3.2 Methodology

I chose a self-study action research approach because it enables practitioners to investigate and evaluate their own work (McNiff & Whitehead, 2006). It is values-laden, recognised as ‘an emotional as well as a cognitive exercise' (McLaughlin & Ayubayeva, 2015), and acknowledges the importance of a ‘knowing subject, from within a social context’ (McNiff, 2008: 352). The impact any ‘insiderness’ might have on the research is not viewed as ‘potential contamination of the data to be avoided' (Attia & Edge, 2017: 35), but rather as essential to the creation of personal, living theories. McNiff and Whitehead (2006) highlight the significance of these theories for sustainable educational change, acknowledging that sustainable change happens only when people create and implement their *own ideas*. Struggling to adapt to the demands of a socially distanced classroom, action research offered me an alternative to ubiquitous, one-size-fits-all theories (Glenn,

2011); an alternative through which I could generate relevant, useful knowledge and engage in an 'authentic, purposeful, and reflective form of professional development' (Killingsworth Roberts et al, 2010: 259).

In any year, a 'focus on caring for their students can result in teachers neglecting their own emotional well-being, leading to stress and a sense of inadequacy' (McDonagh et al, 2019: 191). I felt that inadequacy keenly this year. Without the usual support of staffroom debriefs, this feeling was intensified by a sense of isolation; of 'swimming alone against an ever-rising tide' (McDonagh et al, 2019: 191). Critical reflection allowed me to identify action research as a potential life buoy. Not only could it allow me to realign my practice with my values, but the development of a publicly validated living theory (Whitehead, 2009) could, I figured, give me the very boost that I needed. Covid-19 had taken away my sense of agency in the classroom. Positioning myself as an action researcher could allow me to reclaim that agency. The uncertainty of the pandemic had led me to crave moments of stability; to search for the Big Book of Answers (McNiff, 2017). I would not find this book. However, I *could* extract positive outcomes from the messiness of classroom research (McDonagh et al, 2019). I could change my practice, my understanding of my practice, and even the conditions under which I practiced by changing how I relate to others and to circumstances around me (Kemmis, 2009). I could begin what Schulte (2002: 101) calls a 'continuous evolution of one's own understanding and perspectives.' And in that, at least, there was certainty.

3.3 Data Collection

3.3.1 Qualitative Data

My epistemology, which holds that there are always multiple interpretations of a single event, led me to choose a qualitative approach to my research; one that would allow me to construct knowledge rather than 'find' it (Merriam & Tisdell, 2016). Importantly, qualitative research is 'an effort to understand situations in their uniqueness as part of a particular context and the interactions there' (Patton, 1985, as cited in Merriam & Tisdell, 2016: 15). Given the singularity of a context that forced the children to learn remotely, and- later- forced me to continue working remotely, this approach seemed apt. After all, it would allow me to achieve a deep understanding of the various interpretations of this experience (Merriam & Tisdell, 2016). As a self-study, the collection of qualitative data was also deemed appropriate. In qualitative research, 'qualities such as subjectivity do not produce bias that undermines the research' (Clarke & Braun, 2013: 122). Rather, these qualities were essential to the quality of the descriptive account of my learning (Merriam & Tisdell, 2016), with my values 'fundamental in generating and interpreting the data' (Baumfield et al, 2017: 28).

3.3.2 Data Collection Sources

This qualitative data was gathered from three main sources, as illustrated in Figure 3.1 below.

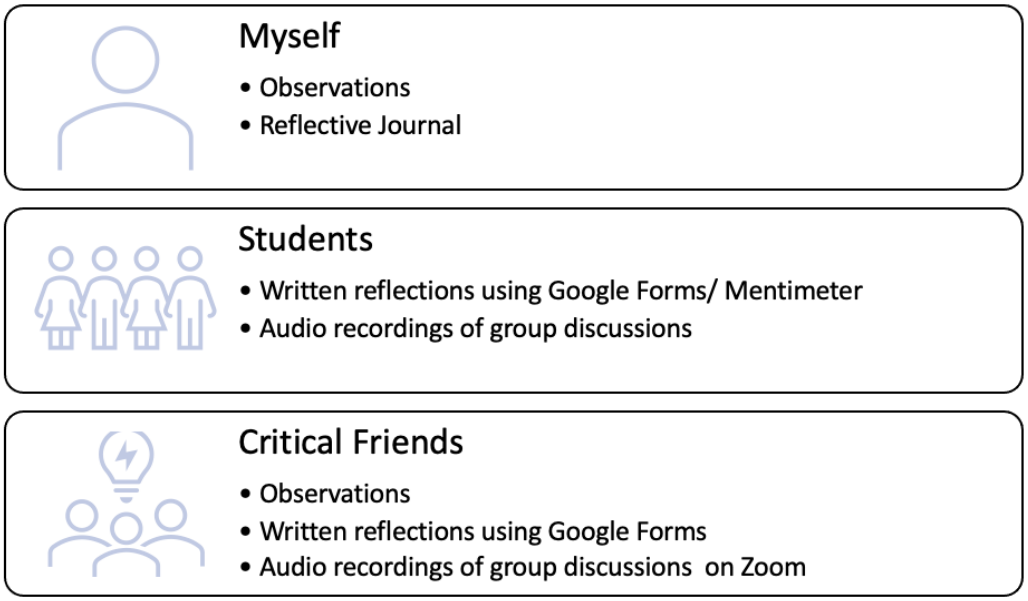

Figure 3.1: *Data Collection Sources and Tools*

As a self-study, my own observations and reflections provided key data about changes in how I thought and how I went about my work (Sullivan et al, 2016). A critical friends group, meanwhile, was established with four colleagues who understood the context in which I was working. My partner teacher, alongside the two SETs and SNA who worked with my class, agreed to support my enquiry through examination, critique, and dialogue (Blake & Gibson, 2020). It is important to note that my research did not aim to measure how digital technologies used in conjunction with cooperative learning affects 'achievement,' or traditional learning outcomes. Instead, it aimed to investigate how I could use digital technologies to facilitate the cooperative learning *process.* My search for 'results' therefore began with the children's reflections on this process.

3.3.3 Data Collection Tools

Open-Ended Questionnaires

Children and critical friends reflected on each stage of the cooperative learning process by responding to open-ended questions in writing using Google Forms. The children were asked to fill in seven questionnaires as part of the group processing stage of their activities, while critical friends were asked to do so twice; at the end of each 8 week action cycle. The asynchronous nature of these responses allowed participants to consider them carefully, while the option of keeping them anonymous offered a chance to stray from 'standard, accepted normative views' (Hewson, 2014: 429).

Group Discussion

Responses to these questionnaires and to anonymous Mentimeter surveys were then used to stimulate dialogue both within cooperative groups and at a whole class level (Johnson & Johnson, 2013), with the help of breakout rooms on Zoom during school closures and the interactive whiteboard on the children's return to the classroom. The importance of carefully structured oral interactions has, after all, been proven as crucial to the success of cooperative learning for decades (See Yager et al, 1985, for example). The audio of two whole-class discussions was recorded and transcribed. This sustained dialogue about teaching and learning created a feedback loop (Figure 3.2) that served to benefit not only the 'learners' thinking about their own learning and development', but my practice as a teacher, too (Baumfield et al, 2013: 26).

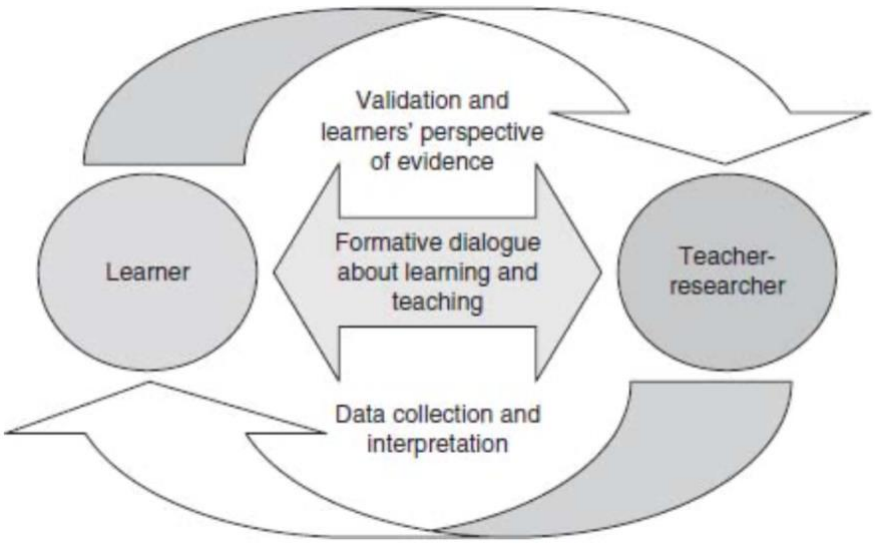

Figure 3.2: Diagram of how Pupil Consultation can Support Formative Feedback Loops (Baumfield et al, 2013: 26)

Three formal critical friends' group discussions were conducted and recorded over Zoom, and provided insights that helped to clarify my thinking, develop my understanding and generate the new questions I needed to explore (Sullivan et al, 2016). I regularly reported my findings to all participants, and used them to design later questionnaires and discussion group conversation starters. This ensured that my findings 'truly reflected the attitudes and beliefs of my respondents' (Baumfield et al, 2013: 26).

Observations

As my own observations of the children's level of engagement in their cooperative learning tasks were limited to monitoring their online interactions and the progress evident in work samples, I called upon the critical friend who took over as class teacher in Action Cycle 2 to share with me any of the five essential elements of cooperative learning on display in the classroom. These observations then served to inform my reflections.

Reflective Journal

It was in my reflective journal that I tracked the story of my journey; the impact of feedback loops; the changes in my thinking and in my actions that are 'at the heart of generating theory from practice' (Sullivan et al, 2016: 79). Korthagan's *onion model* (Figure 3.3) outlines six different layers in which teacher learning can take place: the environment, behaviour, competencies, beliefs, identity and personal mission.

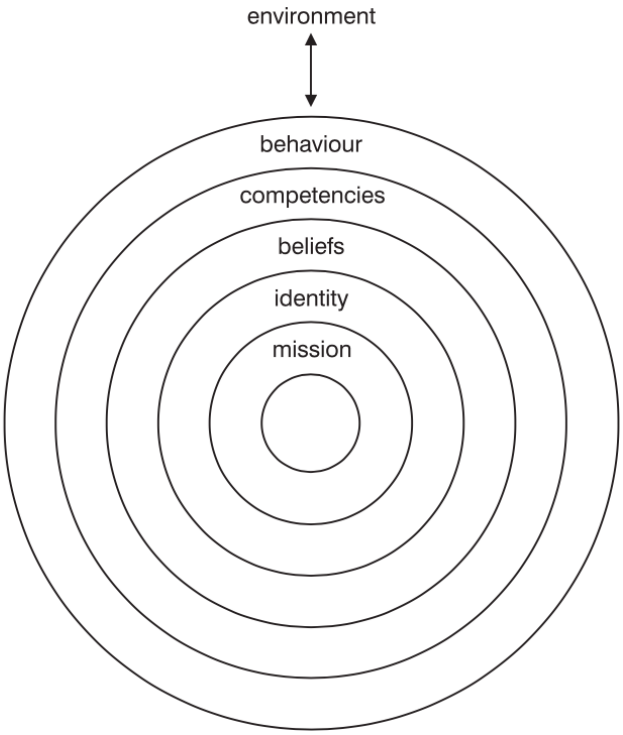

Figure 3.3: Korthagan's Onion Model (Korthagan & Vasalos, 2005: 54)

The reflection process helped me to connect the inner and outer 'onion layers', highlighting a disharmony between the environment and my behaviour and my identity and mission (Hoekstra & Korthagan, 2011). Through reflection, I was able to develop a rationale for practice that was in line with what I saw as my 'mission' and to translate this into concrete behaviours; into informed actions. The themes that emerged in my data analysis pointed to the fundamental importance of affectivity in teaching and to teachers

(Nias, 1996). By questioning my emotional reactions and their role and significance in shaping my views and behaviour (Moon, 2004), I was able to turn what at first seemed to be mere exercises in self-laceration (Brookfield, 2017) into valuable learning experiences that gave me new focus, purpose and drive.

3.4 Ethical Considerations

The questions that my choice of data collection tools raised were primarily ethical in nature: 'At what point does a discussion about learning become data collection and at what point is it pedagogical strategy? Can the purposes of each overlap' (Baumfield et al, 2013: 19)? Would my position of power, as both teacher and researcher, skew the results? The event of the school closure before my intervention commenced meant that these questions required even more consideration. After all, 'ethical questions are complicated in the real world but they are even more complex in the virtual environment' (Kantanen & Manninen, 2016: 87). Below, I explore the ethical considerations I took into account during data collection.

3.4.1 Research Site

The research site was a 6th class classroom in a vertical, two-stream, co-educational school in Dublin, Ireland. The school operates under the patronage of Educate Together and has DEIS status. For a significant percentage of my intervention, the classroom in which I conducted my research was a virtual one. The children used Google Classroom as their online learning platform, alongside Zoom as a platform to facilitate synchronous lessons

and discussions. They also had access to the full range of GSuite for Education apps when logged into their school account.

The children had access to a tablet each on alternate days from September. This allowed for the prioritisation of the digital skills necessary to engage in distance learning when the school closed, as well as the continuation of cooperative learning in the socially-distanced classroom when it reopened.

3.4.2 Informed Consent and Assent

My classroom defined my sample. The 27 children in my class, alongside the 4 adults with whom I worked closely, were all invited to take part. Following approval from the Board of Management, informed assent and consent was sought from children and parents respectively.

The aims, methods and potential outcomes of the research were outlined in a pre-recorded video that was uploaded to our online learning platform, before children and parents were asked to assent and consent using Google Forms (Appendices 10-11). A video was chosen over a live explanation so that those children unable to attend our scheduled Zoom had the chance to assimilate the information in the explanation sheet provided (Appendix 8) at their own pace. As children and young people are 'generally not interested in reading formal informed consent materials' (Hokke et al, 2018: 13), this alternative format was considered appropriate. There was an opportunity to ask questions on Google Classroom, as well as at our next Zoom, before the children decided whether to assent. It was clarified

that this assent could be withdrawn at any time during the process and that a decision to do so would override the consent given by a parent (DCYA, 2012). After all, in order to amplify the children's 'voice,' I needed to ensure that they were 'positioned as participating subjects, knowers and social actors' (Smith, 2011: 14)- and that they recognised as much.

3.4.3 Disparities in Power

Disparities in power between adults and children create an ethical challenge for any researcher. That challenge increases when the researcher doubles as the participants' teacher. This research overlapped with what the students would ordinarily be required to do. I recognised that it could have been difficult for students to ascertain at which point research was taking place as a result (Nolen & Putten, 2007). Furthermore, I acknowledged that the children may have felt pressure from their peers to participate (DCYA, 2012) or, indeed, from me. As such, I ensured to highlight when I was gathering data and reiterated that the children had the option to withdraw on multiple occasions. I was aware, too, that the power imbalance between me, as teacher, and the participants, as my students, had the potential to lead to acquiescence; to children giving me the answers that they thought I wanted to hear. I was left asking a question posed by Stephen Brookfield in 2017: 'How do you democratise something when you have all the positional authority' (Brookfield, 2017: 27)?

In an attempt to transform the entrenched normative social order (Whitehead and McNiff 2006) of the classroom, open discussion about power dynamics was facilitated on Zoom. I

acknowledged the power imbalance that tipped in my favour. I drew the children's attention to it and sought their suggestions on how to address it. They suggested- and provided- honest, critical feedback.

This honest feedback was also provided by critical friends. Enlisting a total of four critical friends may have helped to ensure that dialogue in the group was deepened by combined pedagogical knowledge, but the atmosphere cultivated during discussions was of equal importance. It needed to be a safe environment in which critique and challenges to my assumptions were welcomed (Blake & Gibson, 2020); one in which my colleagues felt empowered to be honest and forthcoming. The rounded critique that emerged from these sessions suggests that I was successful in creating that safe environment. This, in turn, allowed me to 'generate deep, rich, complex understandings of the issues under study' (Kamberelis & Dimitriadis, 2014: 325).

3.4.3 Ethical Considerations for Online Activity

Research involving online activity has its own set of considerations. In a 2018 scoping review of ethical issues in using the internet to engage participants in family and child research, Hokke et al found participant privacy, confidentiality and anonymity to be the most commonly reported ethical concerns. As such, all activities were conducted in line with the school's Internet Acceptable Use and Data Protection policies and parents were redirected to these documents in the letter attached to consent/ assent forms (Appendix 7). I provided logins and class codes and retained control over the services available to the children in the classroom, and- indeed- when they were logged in to their school account at home. 'Mindful of participants' awareness and knowledge (or lack of knowledge) of

internet technologies and privacy settings' (Hokke et al, 2018: 12), I ensured to inform students that their internet usage, including sharing or receiving information, could be monitored in school for unusual activity, and for security and/or network management reasons. Conscious that it was my responsibility, as researcher, to protect online data and participant anonymity, confidentiality and privacy (Hokke et al, 2018), I made sure that remote access to online files was secured using strong passwords that required two-step verification. Children could keep Google Form responses anonymous if they so wished and, when names were provided, data was later anonymised. The children had received training in online safety in their SPHE lessons, and topics covered in these lessons were revised regularly, while virus protection and filtering software was used in order to minimise the risk of exposure to inappropriate material.

3.5 Research Procedure

My research was broken down into two action-reflection cycles, the stages of which are represented in Figure 3.4.

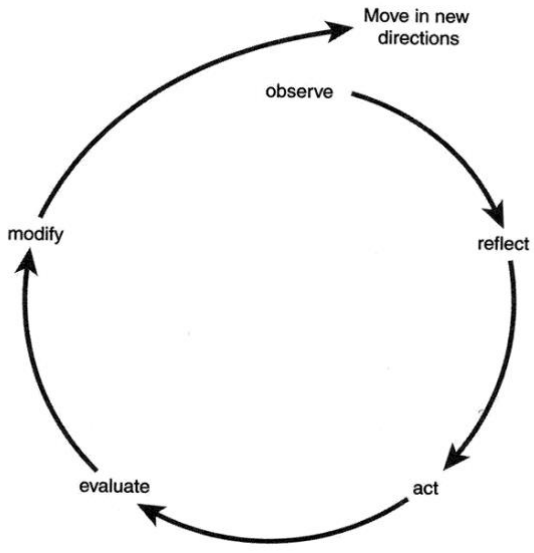

Figure 3.4: An Action-Reflection Cycle (McNiff, 2017: 12)

The new questions raised by an evaluation of my actions in the first cycle allowed me to modify my practice and 'move in new directions' during the second.

Following ethical approval, I organised a critical friends group discussion that centred on my concerns and the underlying values I held as a teacher. Analysis of this data alongside examination of my reflective journal entries and existing literature allowed me to make the pre-instructional decisions required in advance of cooperative learning activities (Johnson et al, 1994). These are outlined in section 3.5.1.

3.5.1 Pre-Instructional Decisions

Nature of the Task

Building upon a project undertaken in partnership with a third level institution in the local area last year, the children were asked to design a character from the future; to explore and suggest solutions for the problems that this character may face. Having been introduced to a fictional future in 'New Dublin' 2100, cooperative groups were asked to create a citizen of that city; an individual who was facing the challenges brought on by the outbreak of a global pandemic. In Cycle 1, the children were tasked with creating a character profile in the form of a collaborative eBook. With their character profile complete, the children were then asked to suggest a possible solution to their character's struggle during lockdown in Cycle 2, creating a stop motion animation to tell the story of their solution's success.

As well as using BookCreator and Stop Motion Studio, the children brainstormed on Jamboard, created storyboards on Google Slides and allocated roles and defined schedules

in shared Docs. They also provided reflections and feedback using Google Forms and Mentimeter, which were then used to instigate whole-class discussions.

The task was what Elizabeth Cohen (1994: 4) would label suitably 'ill-structured.' It was chosen in order to facilitate effective interaction; 'a mutual exchange process in which ideas, hypotheses, strategies, and speculations are shared.' There was no one correct way to approach this assignment. Its open-ended nature meant that interaction within the group became vital to productivity (Gillies, 2003). Unless the children exchanged ideas and shared skill sets, they would not come up with a creative solution. Nonetheless, clear instructions were 'crucial in warding off student frustration' (Johnson et al, 1994: 40). As such, the objectives of the overall project were outlined to the children alongside clear criteria for success, with a rubric (Appendix 12) that included targets for productive cooperative learning.

Composition of the Group

While the literature is quite clear that cooperative groups should have a maximum of 3-4 students, the move to online learning before my intervention began tied my hands somewhat. There were some students who, due to a myriad of home situations, would not be able to participate fully during the school closures. To compensate, some groups had six members. All groups were, however, of mixed ability levels and gender with members selected to include children with a variety of personality types and what Cohen et al (1999) call 'high and low status' students.

Allocating Roles

Like Cohen's approach in Complex Instruction, I endeavoured to adopt a 'multiple abilities treatment' so as to ensure more equitable relations between students (Cohen, 1999). For Action Cycle 1, the children were asked to take on one of the roles and accompanying responsibilities shown in Figure 3.5. These roles were chosen for their distinct, but complementary nature. All contributions required the use of digital tools, and all contributions were needed for success (Cohen, 1999).

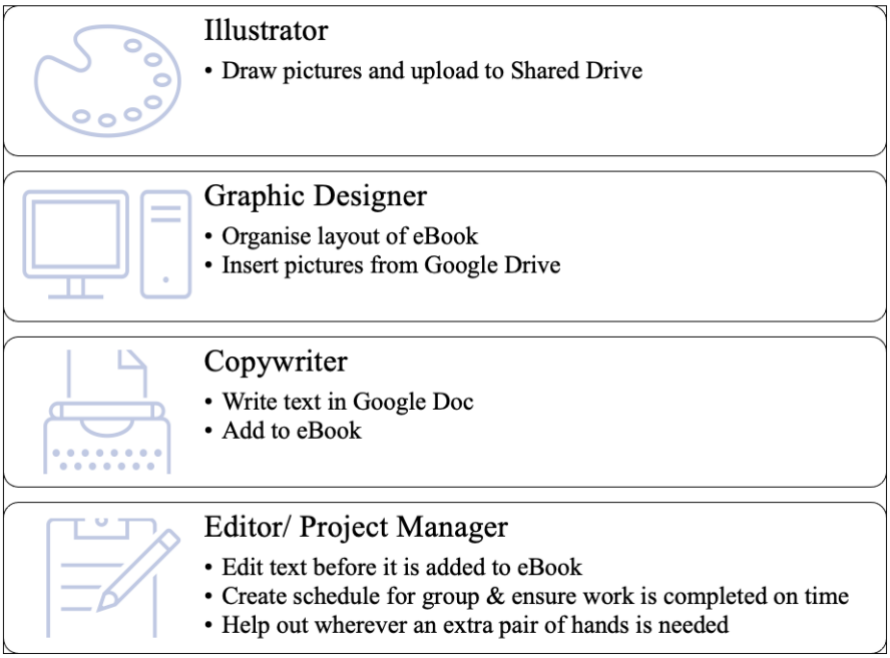

Figure 3.5: Roles and Responsibilities in Action Cycle 1

In Action Cycle 2, the children were again asked to choose from a list of roles (Figure 3.6). In acknowledgment of the fact that 'when students feel that teachers support their autonomy they are likely to value the task and experience positive feelings toward it' (Avi Assor et al, 2002: 262), it was stressed that the jobs listed were not exhaustive; and that the

children were expected to use their initiative, taking responsibility for other areas as necessary and when their assigned tasks were complete.

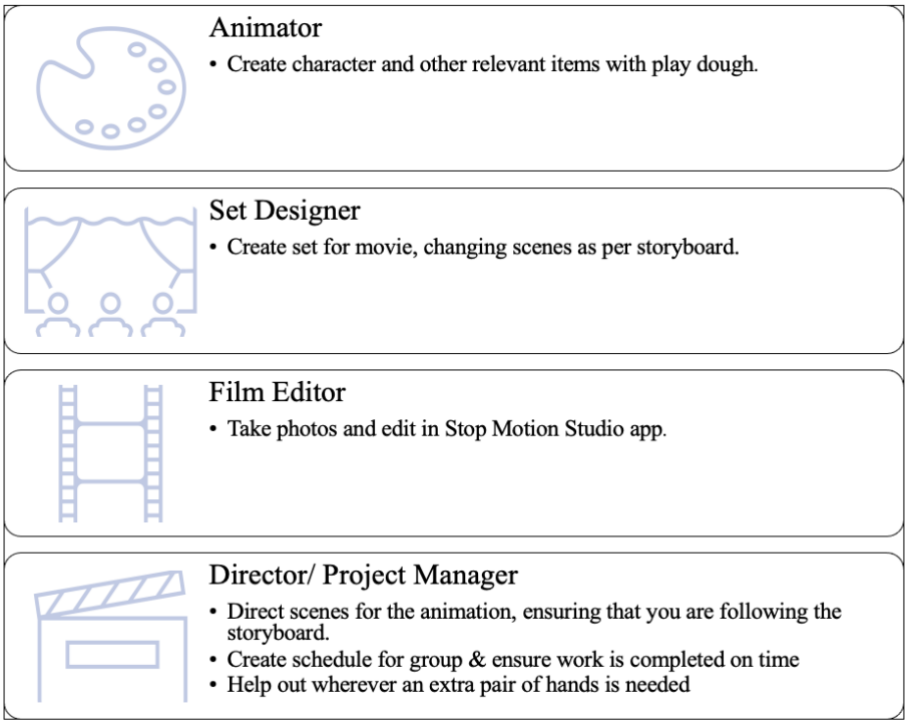

Figure 3.6: Roles and Responsibilities in Action Cycle 2

Choosing a Model

Many of the 'highly structured direct approaches to cooperative learning that must be used in a prescribed, lockstep manner' (Johnson et al, 1994: 43) did not offer the autonomy I wanted the children to experience in a classroom newly bound to other rigid structures and rules. While I intended to use Aronson's 'Jigsaw' (1978, as cited in Johnson et al, 1994) to formally introduce the concept of cooperative learning to the children, I was more comfortable at the other end of the continuum, where lessons were 'structured to specify only positive goal interdependence and individual accountability, emphasize a few social skills, and provide some group processing at the end' (Johnson et al, 1994: 42). I planned to utilise Johnson and Johnson's 5 essential elements for cooperative learning as the

standards against which to measure the success of my lessons and to uphold Elizabeth Cohen's belief that open-ended, 'multiple-ability tasks are a necessary condition for teachers to be able to convince their students that there are different ways to be "smart"' (Cohen et al, 1999: 83). But even Sharan and Sharan's Group Investigation, in which students take an active role in planning what they study and how they study it (Sharan & Sharan, 1992) was too focused on traditional 'research' projects for my purposes. Nonetheless, I was aware that a clearly defined structure was necessary to add coherence to my intervention. Bridge 21 offered structure without being prescriptive. A model of technology-mediated, team-based, 21st century learning that was designed for post-primary classrooms in Ireland, Bridge 21 includes seven main steps: set-up, warm-up, investigate, plan, create, present and reflect (Byrne et al, 2019).

3.5.2 Action Cycle One

These steps allowed me to organise the children's learning activities, which are detailed below:

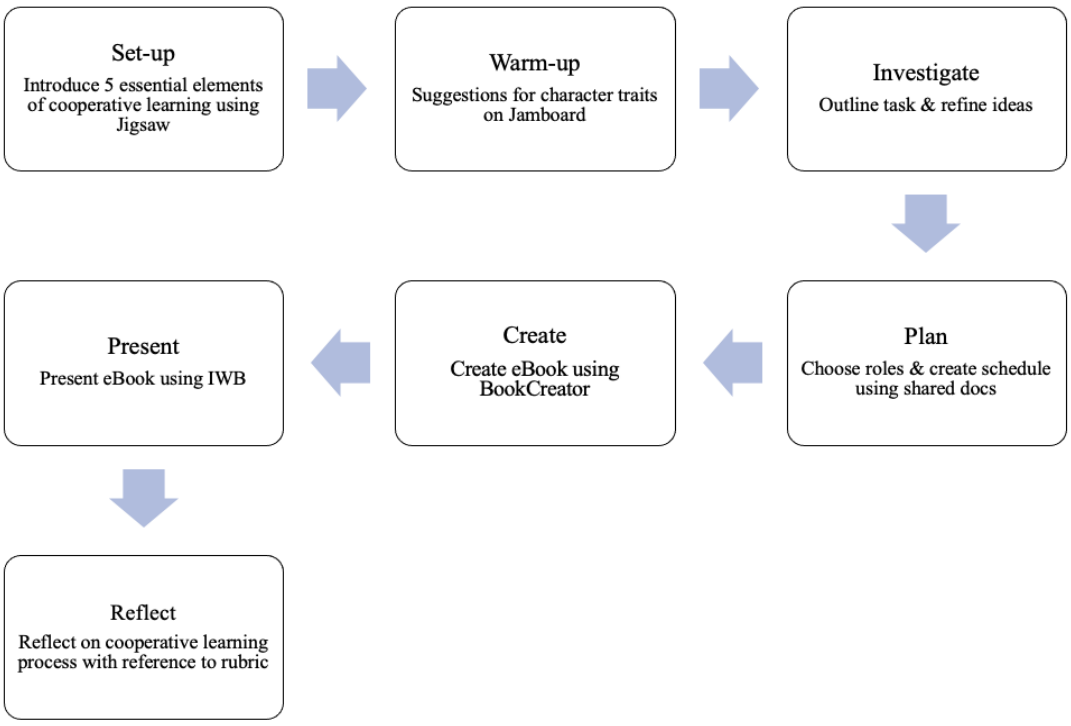

Figure 3.7: Learning Activities in Action Cycle 1

These activities were, of course, only part of the process. Action research is not just about improving social outcomes, but about generating research knowledge at the same time (Somekh and Zeichner, 2009). Plotting learning activities alongside the data collection tools used (Appendix 1) allowed me to address what McNiff and Whitehead (2006) call the dual nature of action research. Data gathered throughout Action Cycle 1 was used to inform the next stage of what is an inherently reflective, iterative process.

3.5.3 Action Cycle Two

Again, the seven steps of the Bridge 21 model were used to plan the learning activities (Figure 3.8), with data collected at each stage of the progress (Appendix 2).

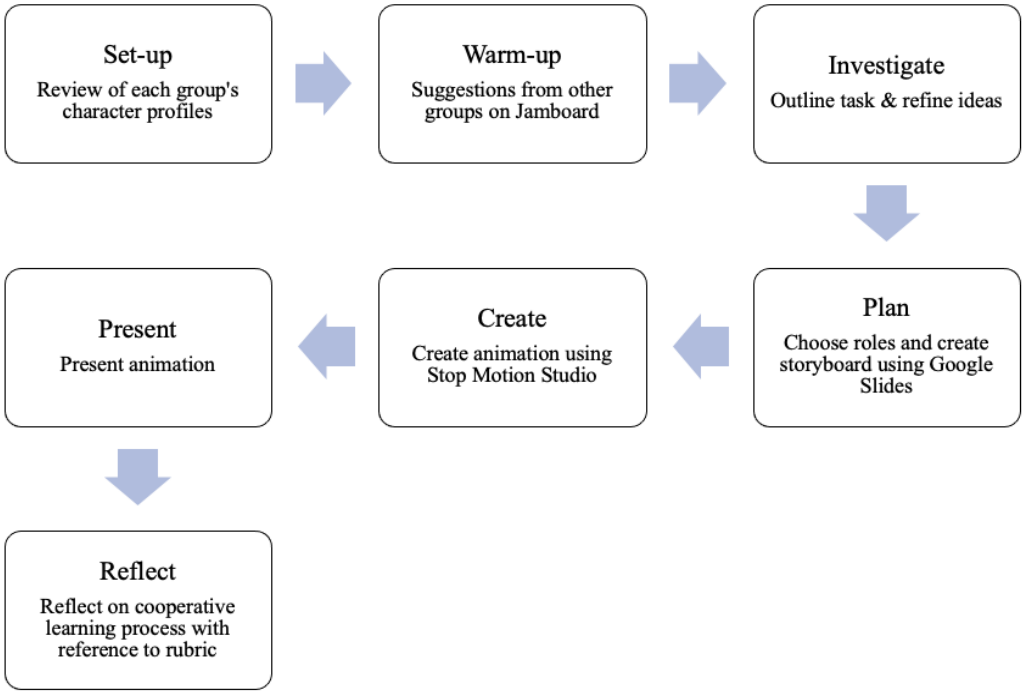

Figure 3.8: Learning Activities in Action Cycle 2

The data gathered from both action cycles was then examined using thematic analysis.

3.6 Data Analysis

Thematic analysis was chosen for the 'rich and detailed account' it would provide (Braun & Clarke, 2006). First, I established a 'finite set of codes that were discrete enough to avoid redundancy, and global enough to be meaningful' (Attridge-Stirling, 2001: 394). This resulted in the extraction of 16 basic themes. Each basic theme was then categorised into clusters of similar issues (Attridge-Stirling, 2001) and labelled as one of three Organising Themes constructed to provide conceptual distinctions, as shown in Figure 3.9.

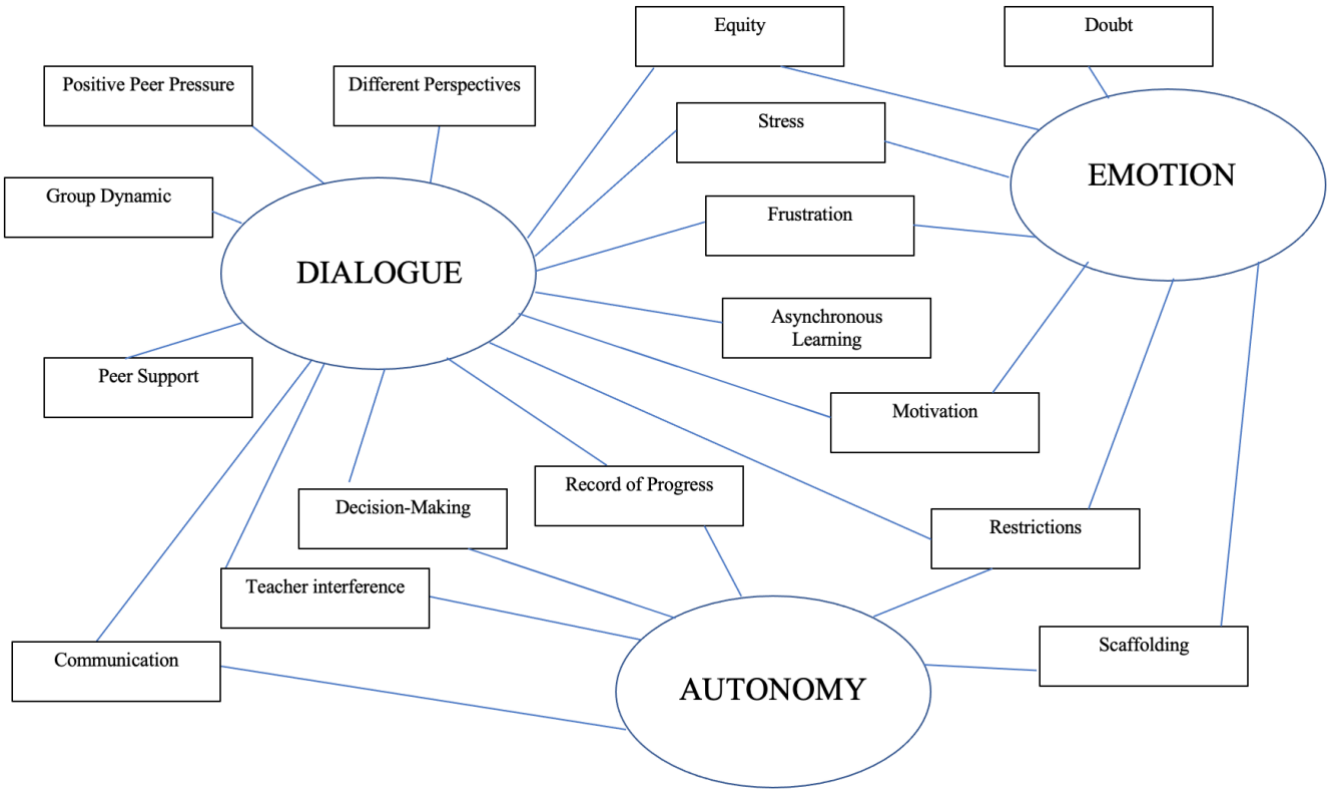

Figure 3.9: Initial Thematic Map

From here, I refined my themes further (Appendix 15). I was left with just two Organising Themes, each of which included three sub-themes. As shown in Figure 3.9.1, I attempted

to identify the essence of the data with names that were concise and immediately gave the reader a sense of what the themes were about (Braun & Clarke, 2006).

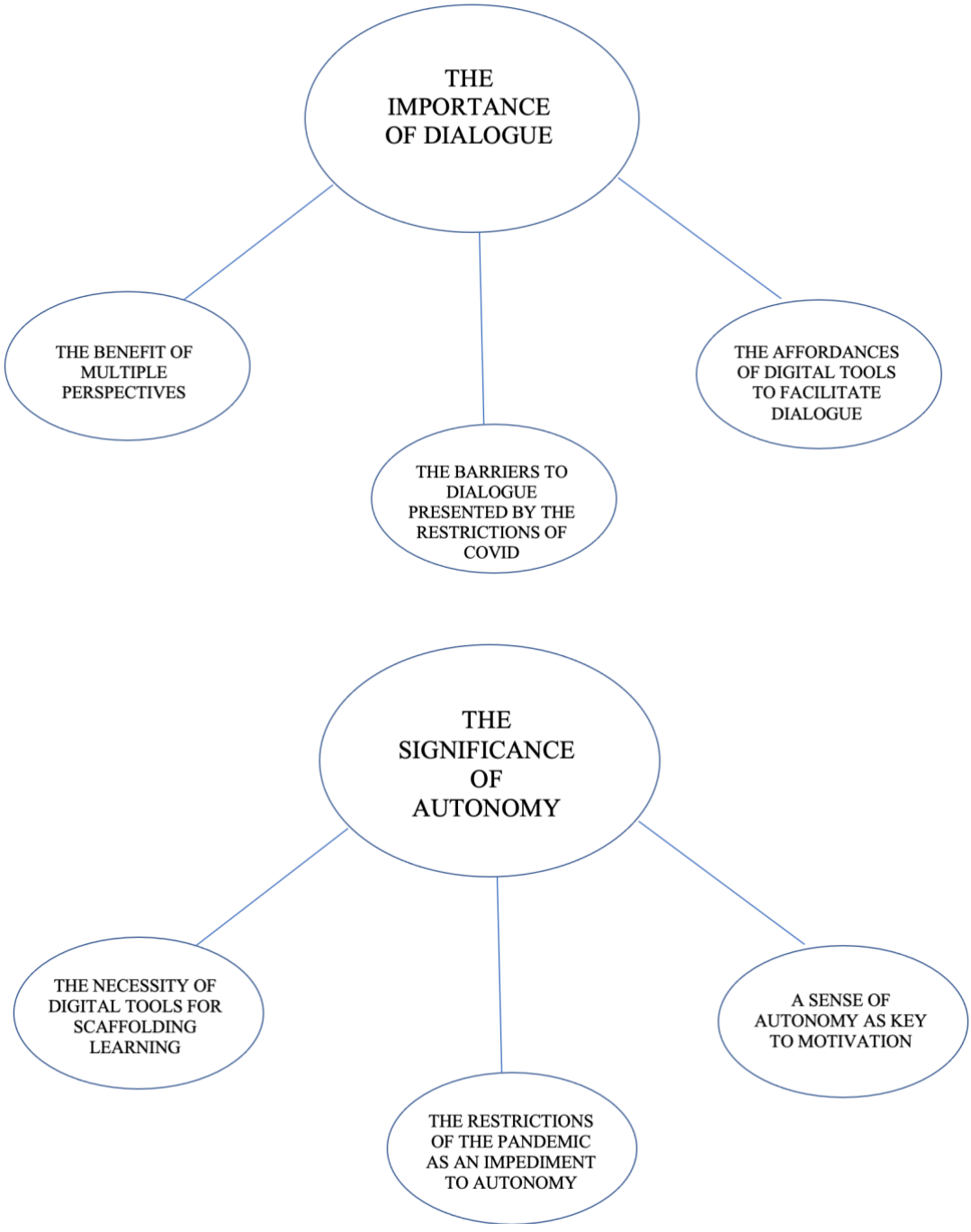

Figure 3.8.1: Final Themes and Sub-Themes

In order to make the ‘messy reality’ (Clarke & Braun, 2013) of my thematic analysis more coherent, some of these sub-themes were split into sections at the write-up stage. These sections incorporated basic themes, and were given carefully-named headings (Appendix 16) so as to present the reader with a compelling, logical and well-ordered story about the data (Clarke & Braun, 2013).

3.7 Validity and Authenticity

Some of the criteria for good quality research are not applicable within the action research paradigm. For example, of Shipman’s 4 criteria- replicability, reliability, credibility and generalisability (as cited in Sullivan et al, 2016: 101)- two can be discarded. Replicability is neither relevant nor valid. Participants are, after all, constantly developing and are not inanimate objects (Sullivan et al, 2016). Similarly, generalisability is not applicable. Personal living theories are not, by their nature, directly transferable.

Instead, authenticity was achieved by giving direct expression to the genuine voice of ‘those whose lifeworlds are being described’ (Winter, 2002: 145). Validity criteria were, meanwhile, linked with the goals of action research as suggested by Herr and Anderson (2005:7), setting out to prove that my investigation demonstrated

1. The generation of new knowledge
2. The achievement of action orientated outcomes
3. A sound and appropriate research methodology
4. Results that were relevant to the local setting and
5. The education of both researcher and participants

by judging against criteria of dialogic validity, outcome validity, process validity, democratic validity and catalytic validity.

3.7.1 Dialogic Validity

My partner teacher, two SETs and SNA acted as my critical friends' group. Their familiarity with the setting, with the children who were participating and with me meant that they were best placed to offer alternative explanations of research data. Meanwhile, a validation group of fellow action researchers from my course allowed for critical and reflective dialogue that helped me to identify taken-for-granted aspects of my practice from an outsider perspective (Herr and Anderson, 2005).

3.7.2 Outcome Validity

Good action research requires a 'successful' outcome. Its integrity rests upon 'the quality of action which emerges from it, and the quality of data on which the action is based' (Jacobsen, 1998 as cited in Herr and Anderson, 2005: 7). As became apparent towards the end of my research, outcomes do not always neatly 'solve' the problem, but rather reframe the problem in a more complex way (Herr and Anderson, 2005). Nonetheless, the cyclical, reflective nature of action research was evident; something that allowed me, as researcher, to move in new directions (McNiff & Whitehead, 2006) as I adjusted my practice accordingly.

3.7.3 Process Validity

This was a self-study; 'an enquiry conducted by the self into the self' (Sullivan et al, 2016: 25) I aimed to evaluate my practice and to see whether or not I could feel justified in claiming that I was achieving my own high standards (McNiff, 2017). Data extracts that showed my values in action were analysed so as to become evidence, with authenticity established using triangulation. Triangulation served to extract deeper meaning in the research (Sullivan et al, 2016) by allowing me to check my research from multiple perspectives, as shown in Figure 3.9.2.

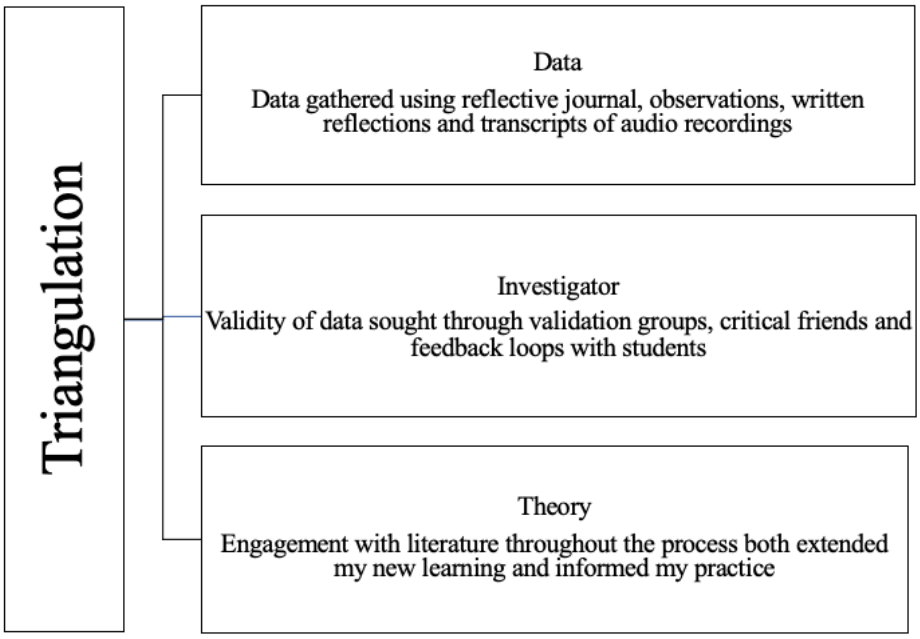

Figure 3.9.2: Triangulation

3.6.4 Democratic Validity

Multiple investigators ensured that the perspectives of all parties with a stake in the problem under investigation were taken into account (Herr & Anderson, 2005), with the

children's reflections and the contributions of my colleagues playing a major role in how I analysed my practice and my understanding of it.

3.6.5 Catalytic Validity

Feedback loops with the children (Baumfield et al, 2017), meanwhile, led to what Herr and Anderson (2005) would call a 'spiralling change' in both my understanding and in the children's understandings, allowing me to determine that my research had resulted in the education of both researcher and participants alike.

3.7 Conclusion

A self-study action research approach was chosen as one that could allow me to understand the unprecedented situation in which I was teaching and to address the sense of dissonance I was experiencing between my values and my practice. I recognised that, in addressing this dissonance, my research had the potential to change both 'practice and the practitioner irrevocably' (Sullivan et al, 2016: 25) and to return the sense of self-efficacy I was missing. Ethical considerations were taken into account before qualitative data was collected in two action-reflection cycles. This data was then examined using thematic analysis. Validity criteria were linked to the goals of action research and by drawing on my own values of student voice and autonomy, allowing me to present my results and analysis as a legitimate claim to knowledge with confidence.

Chapter 4: Findings and Analysis

4.1 Introduction

My research found that digital technologies could be used to facilitate cooperative learning by supporting dialogue between group members and by offering a sense of autonomy to students. The motivation that dialogue and autonomy could generate proved especially important in the context of online learning and, indeed, the socially distant classroom. As such, *The Importance of Dialogue* and *The Significance of Autonomy* could be described as themes that told an authentic, 'convincing and compelling story about the data' (Clarke & Braun, 2013: 121). Meanwhile, sub-themes explicitly addressed my ancillary questions, allowing me to focus on how the nature of the task and the affordances of digital tools affected the cooperative learning process; and on the impact that the Covid-19 restrictions had on that same process (Appendix 17).

The story of the data is presented and analysed below.

4.2 The Importance of Dialogue

4.2.1 The Benefit of Multiple Perspectives

Multiple perspectives were found to enhance dialogue within cooperative groups. The nature of the task was instrumental to their dissemination.

Multiple Perspectives: An Open-Ended Task

From the beginning, it was clear that an open-ended, 'ill-structured' task (Cohen, 1994: 4) meant that discussion and interaction within groups was required. The children recognised that

> *"everyone's contribution was necessary for new ideas"* (Children's Reflections (CR), 15th April 2021)

so that they could

> *"move on and continue in the project"* (CR, 15th April 2021).

Critical friends, meanwhile, noted that when you

> *"have to think a little more deeply about what you're doing, or it's more open...there's more of a chance that you're going to disagree on things"* (Critical Friends Group Discussion (CFGD), 8th March 2021).

I interpreted that chance as a space for Johnson and Johnson's notion of constructive controversy (2018); a space in which the children could utilise the conflict between multiple points of view 'to achieve a synthesis or a creative integration of the various positions' (Johnson & Johnson, 2018: 7). This sat well with my desire to create authentic dialogue; a process that is distinct from mere discussion. Bohm (2004: 7) suggests that discussion is 'almost like a ping-pong game, where people are batting ideas back and forth and the object of the game is to win or to get points for yourself.' Dialogue, on the other hand, involves the interrogation of ideas, the consideration of different perspectives (Gillies, 2016) and a 'flow of meaning' through the group (Bohm, 2004:7) that leads to a new, shared understanding. An appreciation of the benefit of multiple perspectives was evident in feedback from the children:

> *"Working with people is, like, really important sometimes. I think they can bring really, really good ideas to your own idea"* (CR, 15th April 2021).

This appreciation suggested that I had successfully designed my intervention to become a high-level cooperative task; one in which interaction was vital to productivity (Gillies & Ashman, 1998). It also highlighted how the nature of the task had established a sense of positive interdependence within groups. The first of Johnson and Johnson's five essential elements of cooperative learning (1999), positive interdependence is also the most important component of the cooperative learning process (Johnson et al, 1994: 5), and has been described by Treasa Kirk (2005: 14) as 'the building block and the glue that holds the group together.' The perception that each group member's contribution was required led to the 'development of new insights and discoveries' (Johnson and Johnson, 1999: 368), with the children encouraged to 'generate new ideas and cognitive structures within the groups' (Johnson & Johnson, 2018: 9); to rely on the multiple perspectives that their fellow group members could provide.

Exposure to these perspectives was made possible during school closures with the help of digital tools. Jamboard, utilised as what Beauchamp (2011) calls an 'Active Tool for Interaction', offered the children a chance to brainstorm ideas without being tied to their suggestions. There was a certain 'provisionality' (Major et al, 2018: 2008) attached to their contributions; an understanding that ideas could be adapted and changed. As evidenced in Figure 4.1 below, this encouraged children to make multiple suggestions, secure in the knowledge that these suggestions were 'fluid and transitory' (Major et al, 2018: 2008). Essentially, it meant that

> *"everyone put great ideas on each slide and they were all very creative"* (CR, 2nd March 2021).

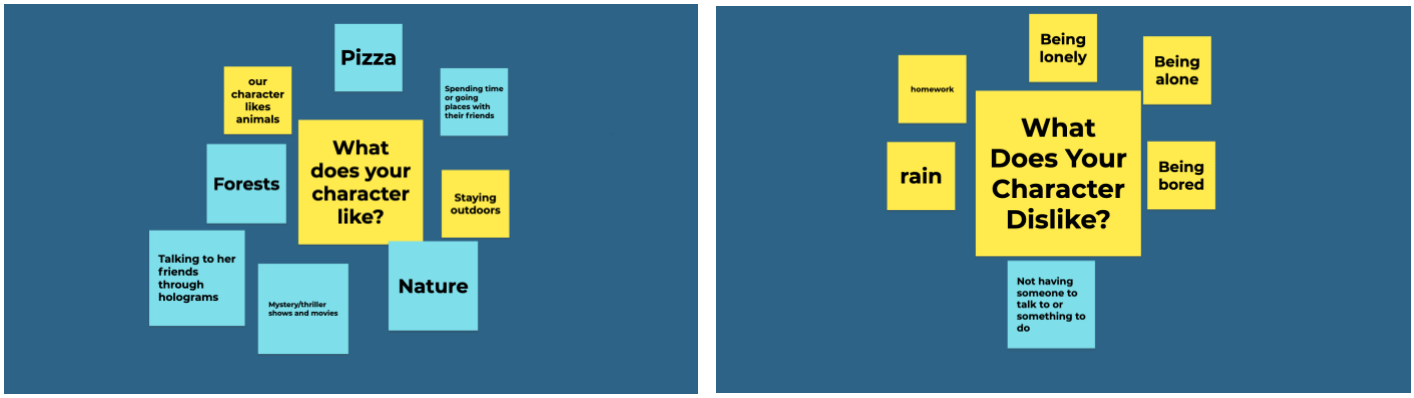

Figure 4.9: The Generation of New Ideas on Jamboard

Because the task presented to them did not have 'one predetermined answer or solution' (Sharan, 2014: 802), the children were forced to exchange opinions, share ideas and discuss how to integrate their outcomes (Sharan, 2014). Discourse and dialogue were required as they worked to create their character and to resolve the problem that their character was facing. All opinions were then considered before arriving at a consensus (Grau et al, 2018):

> *"we made a solution, and then someone added an update to it, and we thought it was much better than the original solution that we came up with. I feel like getting people's opinions is really interesting"* (Whole Class Discussion (WCD), 23rd April 2021).

The nature of the task was also found to impact positively on the second essential element of cooperative learning: promotive interaction. Assistance and other helping behaviours (Gillies & Ashman, 1998) were evident in

> *"live zoom consultations, in comments and dialogues left on the documents and Jamboards on the shared drives, as well as comments encouraging and organising*

> *practicalities on the Google Classroom stream"* (Critical Friends' Feedback (CFF), 25th March 2021).

However, some children were observed to be less inclined towards promotive interaction as a result of the fact that the task had to be facilitated online.

Multiple Perspectives: The Online Nature of the Task

The online nature of the task had a notable impact on its ability to generate multiple perspectives. Critical friends noted a lack of motivation in the children, and attributed it to

> *"factors such as remote learning and a feeling of general apathy as a result of lockdown restrictions"* (CFF, 25th March 2021).

Quite quickly, I realised the prematurity of the *'smug self-satisfaction'* (RJ, 24th February 2021) I had felt about the suitability of my task design during the first two weeks of the intervention. The range of perspectives visible on Jamboard and on the Google Classroom stream began to dwindle as many children began to disengage; to display negative emotions and an absence of focus, interest, effort, curiosity and persistence (Johnson & Johnson, 2018: 2).

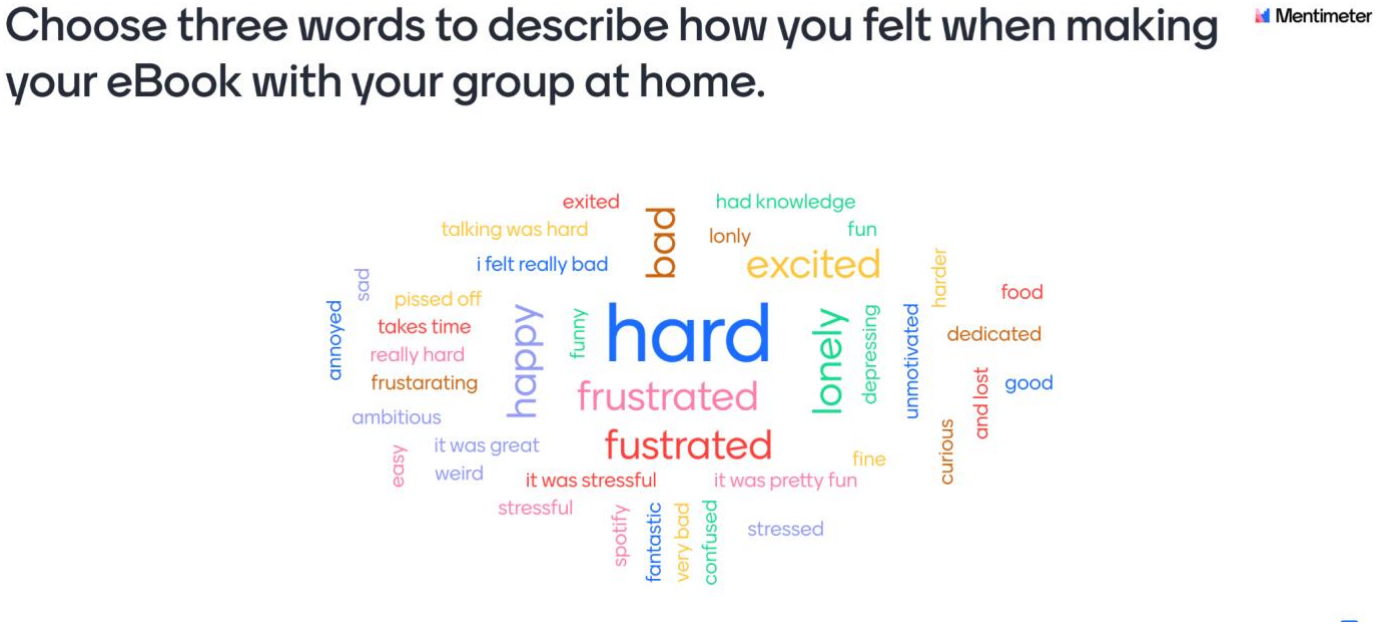

Figure 4.10: Children's Description of Cooperative Learning from Home on Mentimeter (23rd April 2021)

The words chosen by the children to describe the experience of cooperative learning from home (Figure 4.2) were somewhat disheartening, and made me question whether the ill-structured nature of the task was appropriate in an online environment. While I could see past the fact that it was 'hard' or even 'frustrating,' I had difficulty learning that some children felt lonely, sad and 'really bad.' That was the opposite of my intention:

> *"The whole idea of creating an open-ended task with no 'right answer' was to make distance learning less lonely; to ensure that there was a connection established between groups that would mimic the interaction of the classroom.*
>
> *But I suppose, if you are endlessly waiting for a reply to your comments or a contribution to the work that doesn't come, it is lonely. And it is natural for this feeling to be magnified- pronounced- as you hopefully, repeatedly, refresh a page"* (RJ, 24th April 2021).

I was forced to revisit the assumption that the nature of the task would lead to constructive controversy; that a reliance on multiple perspectives would result in higher-level reasoning and effective decision making and 'the development of creative, imaginative, and novel solutions' (Johnson et al, 1994: 80).

Multiple Perspectives: Explicit Teaching of Skills as a Requirement

In order for multiple perspectives to lead to constructive controversy, the explicit teaching of cooperative skills (Gillies, 2003) was found to be necessary. The 'skilled disagreement and rational argument' required to ensure its success (Johnson and Johnson, 2018: 7) was difficult to teach and revise in both the online environment of Cycle 1 and from a distance, in Cycle 2. Consequently, incompatible ideas and opinions often led to the divisiveness and frustration (Johnson et al, 1994) evident in Figure 4.2; feelings that were exacerbated by the barriers to dialogue presented by the restrictions of Covid.

4.2.2 The Barriers to Dialogue Presented by the Restrictions of Covid

The nature of the task may have required interaction and dialogue, but the restrictions of the pandemic made this requirement a source of stress and worry for the children.

Barriers to Dialogue: An Over-Reliance on Digital Tools

Without the possibility of face-to-face promotive interaction and positive peer pressure, the children felt over-reliant on digital tools and concerned that their teammates could *"just decide to not do their part"* (CR, 9th February, 2021):

> *"im afraid after what i have seen that people arn't going to pull their weight and this puts me under a lot of stress"* (CR, 2nd March 2021).

As observed by a critical friend in March, some children felt *"let down"* by the lack of involvement of one or more members of the group (CFF, 25th March 2021). They were, as another critical friend put it,

> *"very much at the, you know, the whim of who's logging on; of who's there and who isn't"* (CFGD, 29th January 2021).

While some children remained consistently active in their online participation, others fell into the role of what Mason (1994, as cited in Vonderwell & Zachariah, 2005: 213) calls 'lurkers', or what Williams (2004) terms 'Read Only Participants'. I could see that they had logged in, but they did not reply to their teammates. Those remaining became what are labelled 'shirkers' in Taylor's 2002 paper on teaching and learning online, and simply did not take part. This supported the theory that students 'may not feel obligated or pressured to participate in online communication when they do not see each other' (Vonderwell & Zachariah, 2005: 212). Without face-to-face dialogue, a vested interest in each other's achievement had not led to the children 'sharing resources, helping and assisting each other's efforts to learn, providing mutual support, and celebrating their joint success' (Johnson et al, 1994: 5) in the way that I had hoped. Instead, it had left them feeling *"unmotivated", "annoyed"* and even *"lost"* (Mentimeter Responses, 23rd April 2021).

Barriers to Dialogue: The Emotional Toll

The barriers to dialogue that a reliance on digital tools created had an emotional toll on the children. In the face of these negative emotions, their sense of positive interdependence was diminished. Children were discouraged by the fact that, online, their teammates

> *"might decide to just not answer"* (CR, 9th February 2021),

and I was compelled to ask myself some difficult questions:

> *"At home, the children are all frustrated enough. Do I really want to add to that feeling right now? Is it fair to add to that feeling right now? Could any valuable learning even come out of this project if that feeling is dominating the process?"* (RJ, 17th March 2021)

Through their frustration, the children magnanimously pointed to wi-fi problems and having to share devices with siblings as issues that could be preventing their teammates from logging on at the scheduled time and responding promptly to their group members' queries. This understanding of the potential reasons for absenteeism did not, however, make the end result any easier. Despite my efforts to provide a structured schedule, the children complained

> *'I have no idea when my teammates will go online*' (CR, 2nd March 2021)

and they were left waiting:

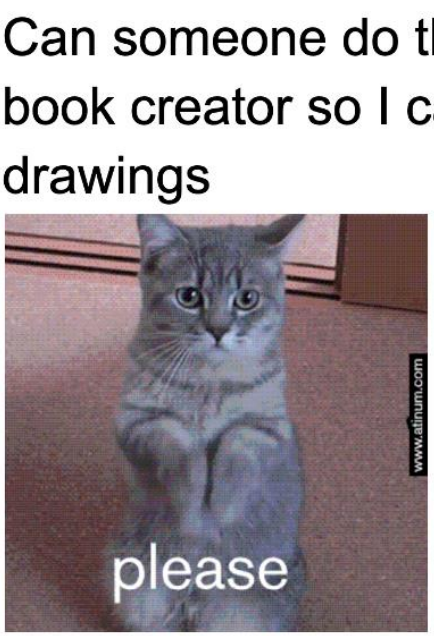

Figure 4.11: Online Communication Between Students (4th March 2021)

It was not viable for everyone to stick rigidly to a schedule during school closures due to various home situations. This meant that many of the cooperative learning activities took place in an asynchronous environment; one in which instant feedback and immediate responses were impossible (Dhawan, 2020).

While a couple of students acknowledged that

> *"Sharing projects, editing, messaging each other etc. were only possible because of technology and use of different programs and applications"* (CR, 25th May 2021),

the general feeling was that

> *'being able to talk with each other would be so much better and more fun'* (CR, 9th February 2021).

Even when that 'talk' was facilitated on Zoom, however, there remained a certain reticence to contribute. Critical friends described the 'tumbleweed' present in some of the breakout rooms and the children themselves observed that

> *"some people rarely talked"* (CR, 2nd March 2021).

This reticence was noted as unusual for the children in question; and was something that had been evident since distance learning began in January, when I wrote

> *'A group normally tripping over themselves to be heard are, all of a sudden, camera-shy'* (RJ, 22nd January 2021).

Faced with the unfamiliarity of online cooperative learning the children were, perhaps, engaging in self-worth protection; 'withholding effort so that failure could be attributed to a lack of effort rather than incompetency' (Johnson & Johnson, 2009: 370). Even the most enthusiastic of students had become quiet, with one parent telling me that his son missed the interaction of the classroom; that he thrived on human contact. My response in my journal was simple: *"me too"* (RJ, 9th February 2021), and I was forced to acknowledge the negative impact of what a critical friend labelled the *"artificial social interaction"* of online group work (CFGD, 29th January 2021).

Barriers to Dialogue: The Artificial Social Interaction of Online Group Work

The social skills that were appropriate in the classroom did not always work online. Passivity was noted to be a learning characteristic exhibited by the majority of students

during the 2020 school closures in Ireland, with a difficulty interacting appropriately with their peers also reported (Winter et al, 2021). My students, it seemed, were no exception. Communicating effectively with other group members while learning from home came up time and again as an issue. The restrictions of the pandemic had a direct impact on the third and fourth essential elements of cooperative learning: promotive interaction and appropriate social skills. The children's capacity to encourage and help one another was, after all, stifled by an inability to communicate clearly and unambiguously online (Johnson & Johnson, 2009). They recognised that prosodic features of oral speech such as intonation, pitch and stress were not inherently present in written language; that a lack of nonverbal cues could lead to difficulties in interpreting nuances (Kim et al, 2007: 338):

> *"You need to make sure the person can understand the tone you're using when typing unlike when talking face to face"* (CR, 9th February 2021).

Critical friends simultaneously observed that

> *"some were not confident in using new technology. Others would be stronger at verbal, face-to-face communication and found the necessity of typing everything tough"* (CFF, 25th March 2021).

These children were, perhaps, daunted by a medium of communication that 'demands keyboard skills and good standards of written language, and also requires the motivation to participate without the support of a live social context' (Beetham & Sharpe, 2013:37). Google Classroom was, after all,

> *"more of a public platform than they would have in school"* (CFGD, 8th March 2021)

meaning that

> *"the safest thing was just to recoil, and let the dominant ones do whatever"* (CFGD, 8th March 2021).

Interestingly, however, the data was somewhat contradictory on this point. Rather than a consistent barrier to dialogue, digital tools were often found to act as a safety blanket; a shield behind from which the more quiet, reserved members of the class felt confident to project their voices.

4.2.3 The Affordances of Digital Tools to Facilitate Dialogue

Digital Tools: Enhanced Participation

Online communication was found to increase the participation of some students, as they did 'not feel inhibited by shyness or low social status' (Major et al, 2018: 2009):

> *"some people that are shy in school are not shy online because they just have to type but when in the classroom it may be hard for that person to interact with people"* (CR, 9th February 2021).

> *"Often we say that screens can create a barrier and, you know, remove people, but -actually- sometimes it can also get their voice heard a bit more"* (CFGD, 29th January 2021).

Text-based online communication meant that participants did not have to compete for speaking rights, allowing shy students 'who may be silenced by overbearing students in oral discussions' to express their ideas more freely (Kim et al, 2007: 339). The fact that the children were equipped with more digital skills than they were during the last lockdown was noted to have made an impact on participation, increasing instances of dialogue between group members.

> *"Because we explicitly taught them these IT skills from September to December, a newer batch of quieter ones, who maybe perhaps didn't have the skills or the resources to practice, are now coming out of the woodwork and coming out their shells, which is really nice to see"* (CFGD, 29th January 2021).

This led to greater equity between 'high and low status students' (Cohen et al, 1999), which could be considered a feature of productive cooperative learning (Cohen, 1994).

Digital Tools: Traceability of Ideas

The traceability of students' ideas, meanwhile, enabled 'dialogues to be sustained, and ideas to be built over time' (Major et al, 2018: 2008).

> *"You can see everyones separate work and hard effort and suggest some stuff to t hem to make their work even better"* (CR, 2nd March 2021).

> *"People were inspiring people with their ideas to make even BETTER ideas. We were also adding updates to our older ideas"* (CR, 15th April 2021).

It was clear that this visible, digital record of dialogic exchange led to promotive interaction that made reaching a shared goal more achievable.

Digital Tools: An Aid to In-Person Learning

The affordances of digital tools to facilitate dialogue were even more evident on the return to the school building in March. Here, the focus switched to the learner rather than the technology, meaning that digital tools could fulfil their potential as mediating resources that facilitated interaction (Beauchamp, 2011) rather than merely acting as a poor substitute for face-to-face learning. The dialogue that they facilitated was easier in person. After all, being *"right beside each other"* (CR, 15th April 2021) made the children's awareness of 'the unanimity of purpose of the group and the need to help and support each other's learning' (Gillies and Ashman, 1998: 747) less stressful. Ideas could be 'put forward, respected, scrutinised and challenged' in a supportive, discursive, online environment (Major et al, 2018: 2007) and teachers could observe social interactions,

> *"giving them little hints and help and support"* (CFGD, 29th January)

when necessary.

Digital Tools: Group Processing

The chance to type out their thoughts before sharing them with the wider group helped the children to engage in group processing, with students given the opportunity to 'make more careful word choices and to elaborate thoughts in a way that might not be possible in the rush of face-to-face communication' (Kim et al, 2007: 338). The children were

> *"pushed to reflect on their experience of the project"* (CFGD, 10th May)

using digital tools, and a record of their thoughts provided opportunities to learn reflectively and enhance metacognitive skills (Lou et al, 2006).

> *"it's really interesting to see that sort of, like, progression of 'how did they get to this point?' And 'what were the decisions made?' And to go back, and it's always there"* (CFGD, 8th March 2021)

At times, this gave rise to broader and deeper discussions (Major et al, 2018) that impacted positively on the cooperative learning process. *"Definitely,"* the critical friend who had taken over as class teacher told me,

> *"you hear more from kids than you would, you know, when you throw it out to the class, and maybe you'd get three people who would answer"* (CFGD, 10th May 2021).

Or as a child put it:

> *"sometimes people dont tell their ideas cause they might be shy etc. people were able to express themselves and overall for me it felt less stressful*" (CR, 15th April 2021).

An increased contribution of perspectives at the group processing stage of cooperative learning activities allowed the children to more comprehensively reflect on group sessions, more easily identify actions that were helpful and unhelpful and more effectively make decisions about which actions should be continued and which actions should be changed (Bertucci et al, 2012). As such, digital tools helped to facilitate the learning of cooperative skills and simultaneously developed students' understanding of their personal and social development (Sutherland et al. 2019).

4.3 The Significance of Autonomy

While digital tools were found to play a crucial role in providing the scaffolding necessary in the online learning environment of Action Cycle 1, they could not negate all the impediments to autonomy created by a newly restrictive learning environment. On the return to school, the nature of the task did not sufficiently counterbalance the effect of these restrictions; and a lack of autonomy served to deplete the children's motivation.

4.3.1 The Necessity of Digital Tools for Scaffolding Learning

The necessity of using digital tools to carefully plan and sequence learning activities and provide clear guidelines for success (Kirk, 2005) was found to be especially important given the context in which the intervention was taking place. The scaffolds that digital

tools could provide gave children the necessary support to achieve tasks that they might otherwise have been unable to accomplish (van de Pol et al, 2010).

> *"If we didn't have all these helpful instructions we would be lost on what to do and confused"* (CR, 21st April 2021).

Scaffolding: A Requirement for Open-Ended Tasks

In order to afford the children some autonomy, I had designed the task to be 'inherently uncertain and open-ended, both in [its] solution and in the process by which students arrive[d] at that solution' (Cohen et al, 1999: 83). In Action Cycle 1, however, it was observed by critical friends that, without the advantage of in-person support, some children had ended up

> *"a bit rudderless"* (CFGD, 8th March 2021).

This suggested that more scaffolding was required to ensure that the purpose of the activities was clear and that the motivation to learn remained intact; that a safe structure was provided to 'enable pupils to take risks [and] to think creatively and critically' (Davies et al, 2013: 85). After all, what would have been new and exciting in class became daunting at home. The children were observed to be

> *"a bit more reticent to engage with newer things and newer formats"* (CFGD, 8th March 2021),

and this extended to the intervention in particular:

> *"I don't really like the whole concept of doing group projects from home or over all in covid"* (CR, 2nd March 2021).

Scaffolding: Using a Variety of Digital Tools

Digital tools allowed me to provide instructions across a range of media; to create helpful scaffolds using video tutorials, written guidelines and directions in audio format as well as facilitating dialogue on Zoom and the Google Classroom Stream alike. These instructions aided the cooperative process by allowing students to 'clarify the assignment and the procedures with each other before asking the teacher' (Johnson et al, 1994: 41). Children noted the clarity that Google Classroom provided:

> *"It made things much easier and clearer. Everything was titled which made things more clear and since it was an assignment there was a due date"* (CR, 21st April 2021).

They also commented on how

> *"people could easily share and edit ideas"* and on how *"google drive made things very accesible"* (CR, 15th April 2021).

With Google Drive, I could provide access to shared resources, templates for task lists, and digital prompts that would help the children to co-construct their project (Lau et al, 2017). These scaffolds gave learners more autonomy to brainstorm, exchange ideas and coordinate activities (Lau et al, 2017), impacting positively on promotive interaction. Moreover, joint access to BookCreator and the shared drives meant that there was a visible record of progress that led to a greater sense of individual accountability, with children

able to ‘track work in progress, and see how much each individual in a group [had] contributed’ (Hazari et al, 2009: 189). Children noted

> *“you were able to see clearly that people did their work”* (CR, 21st April 2021),

and critical friends agreed:

> *“There is a lot of visibility and accountability from that point of view. For me and for them”* (CFGD, 10th May 2021).

This visibility is evident in Figure 4.4.

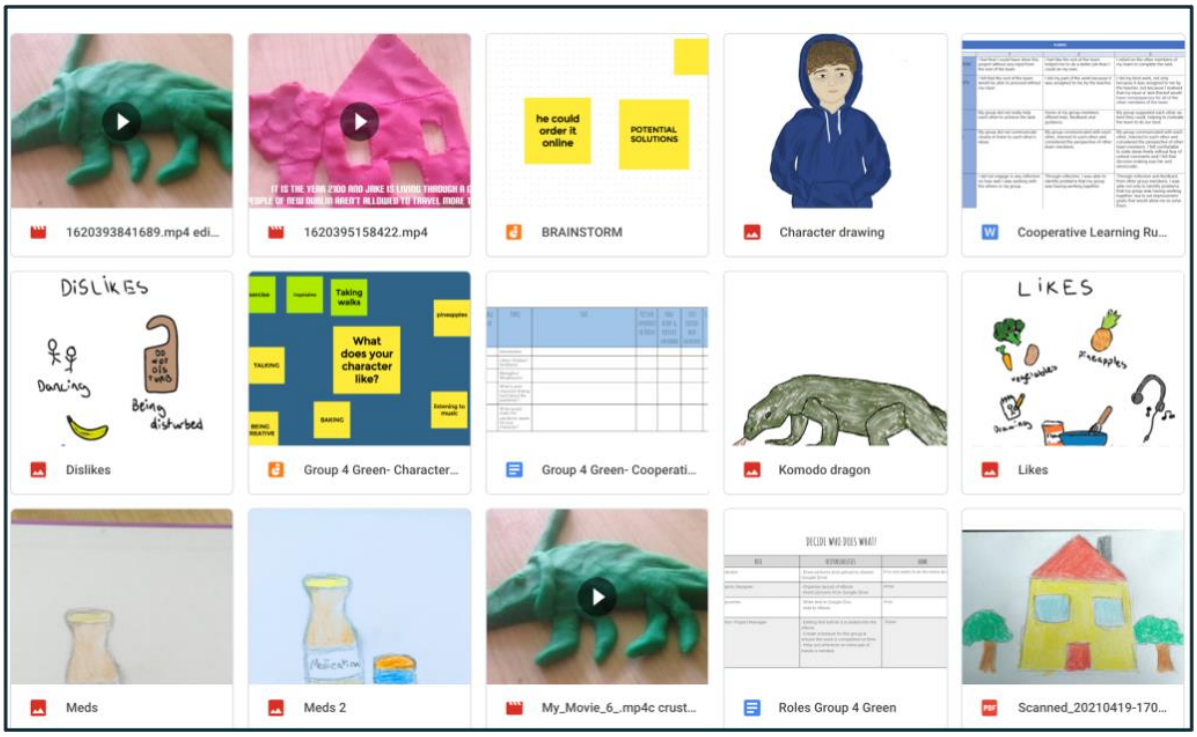

Figure 4.4: Screenshot of a Group's Shared Drive

Shared Google Docs, meanwhile, allowed the children to choose from a list of complementary roles. Scaffolding was provided by specifying the responsibilities that each

group member should take in order to complete the joint task (Kirk, 2005), as illustrated in Figure 4.5. This meant that the requirement of choosing a role became agentic rather than overwhelming, and that it required interaction between group members.

DECIDE WHO DOES WHAT!

ROLE	RESPONSIBILITIES	NAME
Illustrator	-Draw pictures and upload to shared Google Drive	[redacted]
Graphic Designer	-Organise layout of eBook. -Insert pictures from Google Drive	[redacted]
Copywriter	-Write text in Google Doc. -Add to eBook.	[redacted]
Editor/ Project Manager	-Editing text before it is added into the eBook. -Create schedule for the group & ensure the work is completed on time -Help out wherever an extra pair of hands is needed.	[redacted]

Figure 4.5: Shared Google Doc Used to Allocate Roles

While critical friends assured me that without

> *"the allocation of these roles, positive interdependence would have been more difficult to implement or identify"* (CFF, 25th March 2021),

it was evident that, during lockdown, they did not always ensure the equity to which I aspired:

> *"For some, who were in groups with students who were not participating, they felt stressed into overcompensating and did extra work"* (CFF, 25th March 2021).

For others, the barriers presented by their new, virtual learning environment impacted negatively on the children's sense of autonomy:

> *"Because they were not getting feedback from their teammates, they were almost paralysed with indecision. They didn't want to make decisions on the project without the consent of everyone"* (CFF, 25th March 2021).

Unable to make decisions as a unified cooperative group, the children's capacity to direct their own learning was diminished.

4.3.2 The Restrictions of the Pandemic as an Impediment to Autonomy

This difficulty in making decisions was not the only way in which the restrictions of the pandemic served to impede the children's autonomy.

Scaffolds: To Support or Stifle?

The scaffolding identified as necessary often served to stifle rather than support, both at home and on the return to the classroom. In an early critical friends group discussion, I brought this up:

> *"Obviously, we had to be in those breakout rooms for supervision, but do you think that we were making them hold back by just being there?"* (CFGD, 8th March 2021)

This had a negative impact on the promotive interaction and group processing necessary for successful cooperative learning.

Restrictions: Teacher Power v Pupil Agency

In an online environment, there was a clear imbalance between teacher power and pupil agency. Critical friends reported difficulty in finding the balance between encouraging dialogue, and influencing its direction

> *"They need a push, but you can't put words in their mouth"* (CFGD, 8th March 2021).

They also noted how a teacher's presence in breakout rooms led to a certain amount of acquiescence:

> *"I think they nearly felt like they had to agree with me, as opposed to each other, you know? And not go against me"* (CFGD, 8th March 2021).

Distance learning had 'made visible aspects of…pedagogic practice that were previously taken for granted' (Beetham & Sharpe, 2013: 7). In class, teachers can 'quickly ascertain how learners are performing, rearrange groups and reassign activities, phrase explanations differently to help learners understand them better, guide discussion and ask questions that challenge learners appropriately' (Beetham & Sharpe, 2013:7). Importantly, though, they can then walk away and allow the children a chance to experience a sense of agency; to build upon their understanding with a certain amount of autonomy. On Zoom, we could not give them the space to do this.

Restrictions: Social Loafing in Asynchronous Learning

The 'coasting' and 'hitchhiking' of group members (Kirk, 2005: 8) on the work of others is often called 'social loafing' (Johnson & Johnson, 2009). Evidence of children seeking 'a

free ride' (Johnson & Johnson, 1994: 30) was identified during asynchronous learning, and the children recognised the potential of Zoom sessions to reduce it. This meant that even the stilted dialogue of the breakout rooms, with

> *"the same voices saying everything"* (CFGD,10th May 2021)

was considered preferable to the lack of control the children felt when doing their work 'off-camera:'

> *"I think this would be much easier if we were always on zoom classes during doing this"* (CR, 2nd March 2021).

Social loafing was, after all, impeding on individual children's autonomy. Tellingly, the allocation of roles was labelled as 'helpful' by one child because it meant that everybody could

> *"focus on themselves and get things done*" (CR, 2nd March 2021).

This focus on oneself is not the goal of cooperative learning. However, the desire to 'get things done' was expressed by many; and the restrictions of the pandemic were identified as a barrier to doing so:

> *"We need to see each other live"* (CR, 2nd March 2021).

Unfortunately, however, the restrictions of the pandemic did not stop acting as an impediment to autonomy even on the return to school.

Restrictions: Barriers to Physical Movement

Barriers to physical movement in the classroom created an impediment to autonomy that had a knock-on effect on the cooperative learning process. The children were

> *"more frustrated with each other in lockdown. They were more frustrated with the work face-to-face*" (CFGD, 10th May 2021)

and this was, it seemed, due to the lack of agency they had in the tightly regulated learning environment of the pandemic.

While the children recognised that the intervention circumnavigated some of these issues

> *"everybody could participate without touching and such"* (CR, 21st April 2021)

they remained cognisant of the fact that there was a better way to learn; that it was simply not possible:

> *"Before, it was just more entertaining. You could actually touch stuff and make ideas. You could talk to people easily. You, kind of, had to try to avoid getting too close to people, even if you were in the same pod. It was just kind of annoying"* (WCD, 21st May 2021).

It was evident that the design and arrangement of classroom space and furniture had impacted on essential features of cooperative learning such as 'student participation in instructional activities, the emergence of leadership in learning groups, and the patterns of communication among students' (Johnson et al. 1994b: 30). The learning space mandated by the Department of Education and Skills (2020b) was not conducive to 'information exchange, peer interaction and reflection' (Lawlor et al, 2010: 605). The children, required to stay 1 metre apart from their teammates, seemed aware of this and noted how it may have affected their use of appropriate social skills:

> *"we tried communicating kindly but we did have to shout a little because it's hard to hear in the classroom so that might have come across as a little rude"* (CR, 15th April 2021).

The fact that they were restricted to their own pod was, meanwhile, noted by critical friends and students alike.

> *"Fifth Class seemed more interactive, and people were going to see what other groups were doing, and getting ideas and getting inspiration. But we don't have that this year 'cause of Covid"* (CFGD, 10th May 2021).

> *"[Last year] everyone was just, like, beside each other. And it was, kind of, like, fun listening to peoples' ideas, even if there was a separate group, listening to their ideas. And they listen to your ideas. I like that. But, like, with this project, you kind of just didn't really have a connection with the other groups at all? And you were just, kind of, working there alone"* (WCD, 21st May 2021).

A focus on digital tools to facilitate an open-ended cooperative task was my effort to offer the children the chance to take responsibility for their own learning (Shi & Han, 2019). However, I could not even offer them the freedom to move around the classroom at will. This freedom was, on reflection, also missing from the task itself.

4.3.3 Autonomy as Key to Motivation

Autonomy was identified as key to the motivation that this cooperative learning task required. There was a cascade effect evident; with the nature of the task impacting on a sense of autonomy and- in turn- on motivation.

Autonomy and Motivation: The Nature of the Task

On the children's return to the school building, it became clear that the nature of the task did not sufficiently counterbalance the negative impact of the Covid-19 restrictions. Restrictions meant that the task was not as ill-structured as I had hoped it would be; that it served to impede the children's sense of autonomy. This lack of autonomy had a negative impact on motivation, as reported when reflecting on the experience of cooperative learning projects before the pandemic.

> *"It was funner doing the other ones. And I actually had motivation and enthusiasm, compared to this one. It wasn't there in this one"* (WCD, 21st May 2021).

> *"It was, like, easier and shorter. And less effort because...no coronavirus"* (WCD, 21st May 2021).

Noting how many of the children's frustrations during Cycle 1 could be attributed to the lack of face-to-face promotive interaction (Kirk, 2005), I had hoped that the return to school would serve as a motivator in itself. I had been buoyed by positive feedback from critical friends on the idea behind the project. The fact that the children

> *"could apply it to their real lives, but also take it away from their personal experience of the pandemic"* (CFGD, 10th May 2021)

was noted to have similarities to a drama activity with the potential for catharsis; an

> *"activity where they could put themselves into a character. They could explore whatever difficulties this character is facing. And they kind of depersonalize it, but they go through the process of it"* (CFGD, 10th May 2021).

However, the fact that I was still working from home had a negative influence on the children's motivation for which the nature of the task could not compensate.

Structure and Autonomy: Striking the Right Balance

Because I was not there in person, I felt that I needed to continue to provide a high level of structure so that the children were clear on what they had to do. By doing so, I think I inadvertently took away some of the creative autonomy so important to an open-ended cooperative task. Without the right balance between structure and freedom, the children were stripped of sufficient opportunity to explore and imagine (Davies et al, 2013), and they started to feel that the task was *"repetitive"* (CFGD, 10th May 2021); that the eBook was enough.

> *"When it lasts so long and has so many steps, it's annoying"* (WCD, 23rd April 2021).

> *"We just lost motivation really quickly. We had it at the start, but then we noticed how hard it was and…..we stopped liking it so much"* (WCD, 21st May 2021).

A Lack of Novelty

Based on their enthusiasm for digital tools pre-pandemic, I had assumed that the technology itself would serve to motivate the children during my intervention. I was wrong. As I witnessed the children's motivation plummet, critical friends explained

> "*it's no longer a novelty to have a netbook in front of you. They're bored of it. So, they're looking for something different"* (CFGD, 10th May 2021).

Working from home, I was hesitant to allocate too much time to the project in my substitute teacher's schedule in any given week. My own autonomy had been impacted by the restrictions of the pandemic, and I felt I lacked the agency to adjust or accelerate my plans as necessary. This led the children to complain

> *"We were doing it for weeks and weeks"* (WCD, 21st May 2021)

and any sense of novelty dissipated. This was significant. After all, novelty has been shown to be necessary to stimulate the creative responses in children that this cooperative task required, with new and exciting school activities significant in motivating students (Davies et al, 2013). The most novel aspect of this project was, it seemed, the learning

environment in which it took place; and its restrictive nature impeded both dialogue and autonomy, impacting negatively on the cohesion of the cooperative group and serving to deplete the children's motivation.

A Lack of Choice over Group Members and Digital Tools

A lack of choice over the members of their group and the digital tools they could use to complete the project served to demotivate the children further. The majority of students felt that it would be better to have

> *"at least one or two people that you know pretty well"* (WCD, 21st May 2021)

in their group in order to make things more 'comfortable.' Feedback such as

> *"most of us don't have much of a social bond or connection between us which makes it a little awkward"* (CR, 9th February 2021)

came regularly, and suggested that the context of the pandemic negated Johnson et al's assertion (1994: 38) that allowing children to choose their own teammates is the 'least recommended procedure' when establishing cooperative groups. Indeed, this feedback suggested that giving the children the option of working with friends could have provided some reprieve from the frustrations of the Covid restrictions. It could have ensured that there were existing levels of trust between members in the group so that they would accept and support each other (Johnson et al, 1994) and be responsive to each other's needs (Gillies, 2003). Unfortunately, however, I simply did not have the agency to make any changes to pods in the middle of a term.

Students also focused on how some of the digital tools they were required to use left them feeling restricted:

> *"especially with the stop motion, we were limited. We were limited with the colours of Playdough, we were limited with the designs because stop motion has to be so simple"* (WCD, 21st May 2021).

'The importance of providing multiple opportunities in which the children could initiate their own activities or make their own choices within a loosely framed activity' (Davies et al, 2013: 85) was clear. However, I did not do this. In my journal, I recorded how my role as 'distance teacher' meant that I was unwilling to give the children an option of creating their final animation using any other app than Stop Motion Studio. Too much choice would, I felt, be more work for my replacement teacher and I did not want to

> *"overstep from my kitchen"* (RJ, 2nd April 2021).

The choice of stop motion animation was not to everyone's taste, however,

> *"Playdough? It's annoying. It gets stuck in your nails and you have to keep moulding it, and then it'll dry out"* (WCD, 21st May 2021).

> *"It was hard to make the figures, and then take a picture of them that's good, and then edit it"* (WCD, 21st May 2021)

and it became evident that the nature of the task had failed to provide sufficient freedom in the ways in which the children could choose to address the challenges of the project (Davies et al, 2013).

Digital Tools as a Panacea for Demotivation: Challenging my Own Assumptions

While critical friends suggested that a lack of motivation was almost predictable at the end of both a challenging year and of primary school

> *"I think, no matter how many bells and whistles you attach to it, it's just their motivation. They're burnt out at this stage"* (CFGD, 10th May 2021),

I was forced to acknowledge my own assumptions:

> *"I was like, you know: 'isn't this exciting doing stop motion? Wouldn't you have loved to have done that when you were in school?' And I, maybe, presumed that they would feel the same about it. But they don't"* (CFGD, 10th May 2021).

The personal learning that arose as I dismantled these assumptions is explored in Chapter 5.

4.4 Conclusion

My intervention highlighted the importance of dialogue and the significance of autonomy in cooperative learning activities, and the affordances of digital tools to facilitate both. While an open-ended task was found to encourage and, indeed, necessitate dialogue within

groups, the intervention could not be examined separately to the context in which it was taking place. The restrictions of the pandemic meant that a sense of positive interdependence was stressful and frustrating for many and that the children felt less motivated due to a perceived lack of autonomy over various elements of the project. Digital tools were found to be essential to providing support and scaffolding; a steadying anchor in unfamiliar territory. They were also found to facilitate dialogue and, in this way, offer some semblance of autonomy in a newly restrictive learning environment. Most importantly, they made cooperative learning *possible*:

> *"It's very easy to sit and go: "Well, these were the issues" because we have the benefit of the technology. If you try and think about how this project would have gone, or how this year would have gone without those resources....it's incomprehensible to me*" (CFGD, 10th May 2021).

The possibilities that digital tools provided meant, however, that I pinned all of my hopes on them; that negative responses from the children were hard to digest. In the next- and final- chapter, I examine how dismantling my assumptions allowed me to align my practice with my epistemology and my values; with implications for my future practice and, indeed, wider policy.

Chapter 5: Conclusion

5.1 Introduction

This concluding chapter addresses how my study resulted in learning at a practical, personal and theoretical level (Sullivan et al, 2016: 121). It outlines how the process of action research allowed me to generate a living theory (McNiff & Whitehead, 2006) and shows how my new learning has improved my practice, how it will improve my future practice and how it has the potential to influence policy.

5.2 Practical Learning

At a practical level, my intervention taught me that in order for cooperative learning to be successful, it was essential that dialogue and autonomy were facilitated; that learner agency was fostered, whereby students sought understanding by 'building from their own ideas and allowing other ideas and opinions to mediate and modify their thinking' (Flitton and Warwick 2012: 101).

Digital tools were found to facilitate the dissemination of multiple perspectives by enhancing participation. They also made it possible to trace ideas, with a record of progress promoting a sense of positive interdependence and helping children feel accountable for their efforts (Johnson & Johnson, 2009). Scaffolds created using a variety of digital tools were found to be essential for open-ended tasks, while the affordances of digital technologies to facilitate cooperative learning were enhanced with the support of in-person learning. A shared dialogic space allowed dialogue to be built over time (Major et al, 2018) and impacted positively on promotive interaction. The ability to adapt or change ideas (Major et al, 2018) and to express them in that digital space was, meanwhile, found to offer

confidence to those children who might ordinarily be reticent to contribute, and enhanced the group processing stage of cooperative tasks. As such, the digital tools used in this intervention could be labelled as beneficial to the cooperative learning process.

The less 'successful' results of my research also led to practical learning. The emotional toll of the online section of the project pointed to the importance of explicitly teaching cooperative skills. The children did not have the necessary training to combat the 'artificial social interaction' of online group work or the social loafing that was more pronounced in asynchronous learning. Barriers to physical movement on the return to school impacted negatively on the cooperative learning process. My ability to scaffold that process without stifling autonomy was, meanwhile, hampered by a lack of face-to-face interaction with my students for the duration of the intervention. Finally, the lack of agency the restrictions of the pandemic offered me, as a teacher, meant that the children's ability to direct their own learning was limited. The lack of choice and novelty the children were left with meant that they were tied to rules and structures that left them deflated and unmotivated.

5.3 The Messiness of Action Research

As evidenced above, the role that digital technologies played in facilitating cooperative learning activities was muddied by the context in which the intervention took place; by what Brookfield (2017: 235) calls the 'contextual ambiguity of teaching.' Schools were closed for the first half of the intervention, while I was forced to facilitate the second half from my kitchen table. This meant that the use of digital technologies was inextricably linked with the restrictions of the pandemic, and with all of their accompanying frustrations. The messiness of the action research process forced me to acknowledge that

'difficult pedagogic dilemmas have no ultimate solution' (Brookfield, 2017: 235). As I attempted to put some purposeful experimentation on my practice, I became painfully 'attuned to teaching's complexity, its chaos and its contradictions' (Brookfield, 2017: 235).

5.4 Personal Learning

Above all else, my research helped me to recognise what Nias (1996) calls the fundamental importance of affectivity in teaching; to recognise that to truly feel motivated and satisfied by my work, I need to feel that the children are, too. I was disappointed by the results of my intervention. Digital tools had made cooperative learning possible, but the children did not respond with the enthusiasm I had envisioned. My emotional response to the perceived shortcomings of my intervention led me to question whether I had succeeded in addressing the sense of dissonance between my practice and my values at all; to wonder if I was still a 'living contradiction' (Whitehead, 2009).

5.4.1 Still a Living Contradiction?

I claimed to adhere to an epistemology that held knowledge to be uncertain and ambiguous, created rather than discovered; one that maintained meaning was negotiated with other knowing individuals (McNiff and Whitehead, 2006: 29). Indeed, this epistemological stance was what had led to my research in the first place. However, the discomfort I felt as my assumptions came crashing about my feet made it clear that I had not truly adopted this stance in relation to my *own learning*. Rather, it seemed that I had accepted this definition of knowledge as appropriate only for the children I taught. I was still a living contradiction (Whitehead, 2009). I needed to be more open to change, and to

base this change on reflective analysis through four distinct lenses: my students' eyes, my colleagues' perceptions, theory and my own personal experience (Brookfield, 2017: 62).

5.4.2 Becoming a Critically Reflective Practitioner

Korthagen (2017) suggests that a teacher's behaviour is the result of a complex mix of cognitive, affective and motivational sources, which remain partly implicit and are often not reflected on. My self-study action research forced me to reflect, teaching me the importance of open, dialogic interactions between me, my colleagues and my students to enhance my own learning.

The reflective process allowed me to grow more comfortable with the fact that there are no neat solutions for difficult problems (Brookfield, 2017):

> *"Originally, the messiness of action research appealed to me. Data analysis made me change my mind; to crave the ability to wrap my results up with a neat little bow; to curse the fact that I could not. Now, I am back to appreciating the process. My findings feel <u>real</u>. They reflect this year as it truly was. There were no bows around anything"* (RJ, 10th August 2021).

I have accepted that 'we should never lose the sense that we're imposters struggling in the dark, trying to draw meaning from contradictory and often opaque experiences.' After all, 'to feel this is to open up permanent possibilities for change and development in our practice' (Brookfield 2017: 231)

5.5 Impact on Future Practice

This practical and personal learning will allow me to live more closely to the values identified in Chapter 1. Below, I explore how I will link the facilitation of dialogue in cooperative learning directly to the promotion of student voice, and how I will reclaim the teacher agency required to offer autonomy to my students.

5.5.1 Dialogue to Promote Student Voice

The shared dialogic space that digital tools can provide will allow me to promote student voice in my classroom. The multiple perspectives and feelings expressed there will allow me to further advance my knowledge of how to adjust my practice to meet the children's needs (Smith, 2011). As such, my future use of digital tools to facilitate dialogue in cooperative learning activities should serve to amplify student voice and generate some of the motivation that was missing from my intervention. After all, 'when students are taken seriously and attended to as knowledgeable participants in important conversations, they feel empowered and motivated to participate constructively in their education' (Cook-Sather, 2002: 3).

5.5.2 Teacher Agency to Provide Autonomy

Promoting student voice is significant, but 'to truly listen means to have to respond' (Cook-Sather, 2002: 8), and teacher agency is required for this response. My research taught me that teacher agency is necessary to support autonomy in cooperative learning activities. As explored in Chapter 4, Covid was a force against which I could not push back (Buchanan, 2015), with restrictions often preventing me from altering, adjusting and accelerating plans as I saw fit. This opened my eyes to how important having the power to change the context of my daily practice really was to me (Baroutsis et al, 2016), and to the

reciprocal relationship between professional identity and agency (Buchanan, 2015). As the restrictions of the pandemic ease, I will ensure to reclaim and exercise agency in my practice by *stepping up* and going above and beyond the perceived expectations of my role or- indeed- by *pushing back* and negotiating policies with which I do not agree (Buchanan, 2015: 710).

This negotiation may prove important. A neoliberal reframing of educational policies has, after all, 'given rise to an increasing focus on measurement and comparison-based outcomes for schooling' (Baroutsis et al 2016: 123). This means that even when the restrictions of Covid lessen, policy could serve to hamper the agency I experience as a teacher.

5.6 Potential to Influence Policy

In Ireland, the process of curriculum development is ongoing. The 22-year-old primary school curriculum was initially lauded for its progressive, child-centred approach. However, it has more recently been criticised for the competing demands of its many aims and objectives, which serve to challenge its 'espoused child-centred nature' (Walsh, 2018: 8), and also for its overload of detailed, prescribed content, which goes against the autonomy it claims to offer teachers (Gallagher, 2020; Walsh, 2018). I cannot claim that my research resulted in clear-cut answers of how best to exploit the affordances of digital technologies to facilitate cooperative learning. Instead, it has highlighted that context is crucial; and that practice should be adapted to cater for the specific needs of each group of children and the particular circumstances of a given year. This in itself is important, however, and signals the need for a curriculum that is 'flexible enough to allow for

technological and cultural change' (Voogt et al, 2013); one that affords autonomy to students and teachers alike.

The role of ICT, with its untapped potential to develop competencies essential for a changing world, promises to be central to curriculum reform. This is evident in the Digital Strategy for Schools (2015) and the accompanying Digital Learning Framework (2017). These documents are not just for those motivated pioneers inclined towards 'individual heroism' (Voogt et al, 2013). Rather, they are directing *all* teachers towards integrating technology into their broader practice, and towards making that practice less didactic and content-led. My research points to the importance of providing scaffolded, open-ended and novel tasks when doing so.

5.7 Recommendations for Future Research

This study could be extended by an analysis of how cooperative learning can be used in conjunction with the Digital Strategy (DES, 2015); of the potential of cooperative learning to achieve the strategy's aims of embedding ICT 'more deeply across the system to enhance the overall quality of Irish education' (DES, 2015: 5). As context and its 'emotional toll' had such a clear impact on my findings, undertaking further research in this area in a classroom setting without the restrictions of a global pandemic could add a different dimension to the results.

5.8 Conclusion

Dialogue and a sense of autonomy proved vital to the success of cooperative learning in the unusual context of the 2020-21 academic year. Used to support an open-ended, ill-

structured task, digital tools were found to facilitate dialogue and to provide necessary scaffolds in an unfamiliar learning environment. The negative emotions triggered by the restrictions of Covid could not always be counterbalanced by the nature of the task or by the affordances of digital technologies, however, as the pandemic affected not only the children's autonomy, but mine too. These findings have implications for my future practice and, indeed, for policy; suggesting that greater flexibility needs to feature in the classroom and curriculum alike.

The practical learning that I took from my research was, in many ways, secondary to the personal learning gleaned. In the pursuit of a practical solution to an issue of pressing concern (Bradbury, 2015), I was able to develop my own living theory; one that was intertwined with my values of student voice and autonomy. My research found that digital tools could facilitate dialogue. It follows that they can be used as a tool with which to amplify student voice. As a teacher, my role is to respond to student feedback appropriately, adjusting my approach so as to promote a sense of autonomy and successfully reap the long-proven benefits of cooperative learning.

I can now claim to know how to engage my students in honest and reflective dialogue, and- crucially- why I should do so. I can also claim to know how to promote a sense of autonomy in the classroom. Importantly, I now understand why a loss of agency as a result of the pandemic led me to suffer from a crisis of confidence. This agency is, after all, central to my sense of professional identity. By reclaiming it, I will be able to actively encourage the children's democratic participation in their schooling (Baroutsis et al, 2016) and use their feedback to aid the continuous evolution of my practice.

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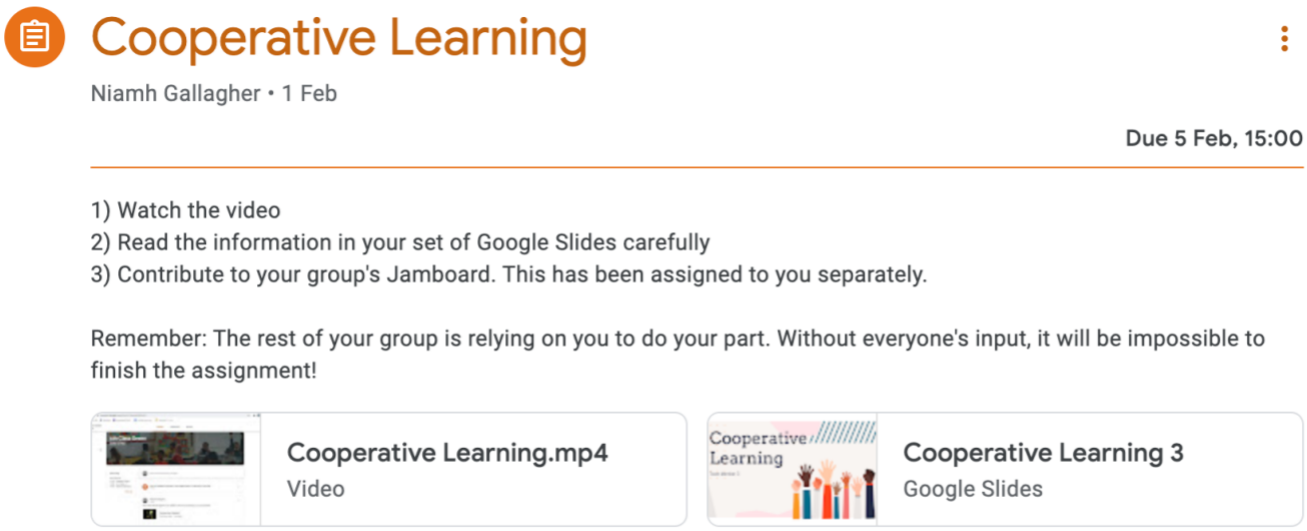
Appendices

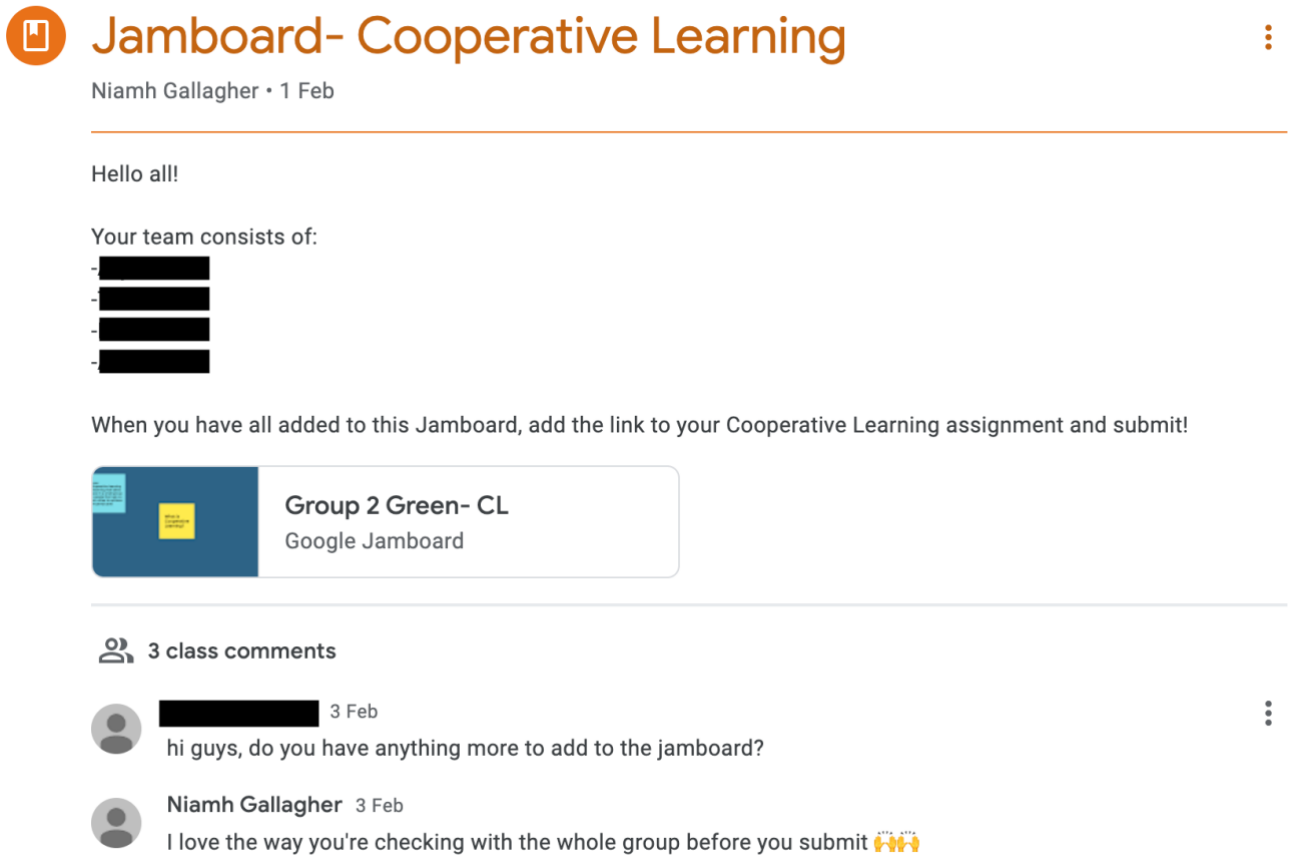
Appendix 1: Overview of Action Cycle 1

	Task	Digital Tools	Data Collection
	-Pre-instructional decisions	-Zoom	-Audio recording of critical friends' group discussion -Reflective journal
Week 1	-Introduce 5 essential elements of cooperative learning using Jigsaw -Reflect on Progress	-Google Classroom -Google Slides -Jamboard -Google Forms	-Children's written reflections on Google Forms -Observations -Reflective journal
Week 2	-Brainstorm character traits -Outline task	-Google Classroom -Jamboard	-Observations -Reflective journal
Week 3	-Reflect on Progress	-Google Classroom -Mentimeter -Google Forms	-Children's written reflections on Mentimeter & Google Forms -Observations -Reflective journal
Week 4	-Complete brainstorm -Choose roles	-Google Classroom -Zoom -Google Drive -Google Docs -Jamboard	-Children's feedback on Zoom -Observations -Reflective journal
Week 5-7	-Create eBook -Reflect on progress	-Google Classroom -Zoom -BookCreator -Google Drive -Google Docs -Jamboard -Google Forms	-Children's written reflections on Google Forms -Audio recording of critical friends' group discussion -Critical friends' written reflections on Google Forms -Observations -Reflective journal
Week 8	-Present eBook -Reflect on progress	-Zoom -BookCreator -Interactive Whiteboard	-Observations -Reflective journal

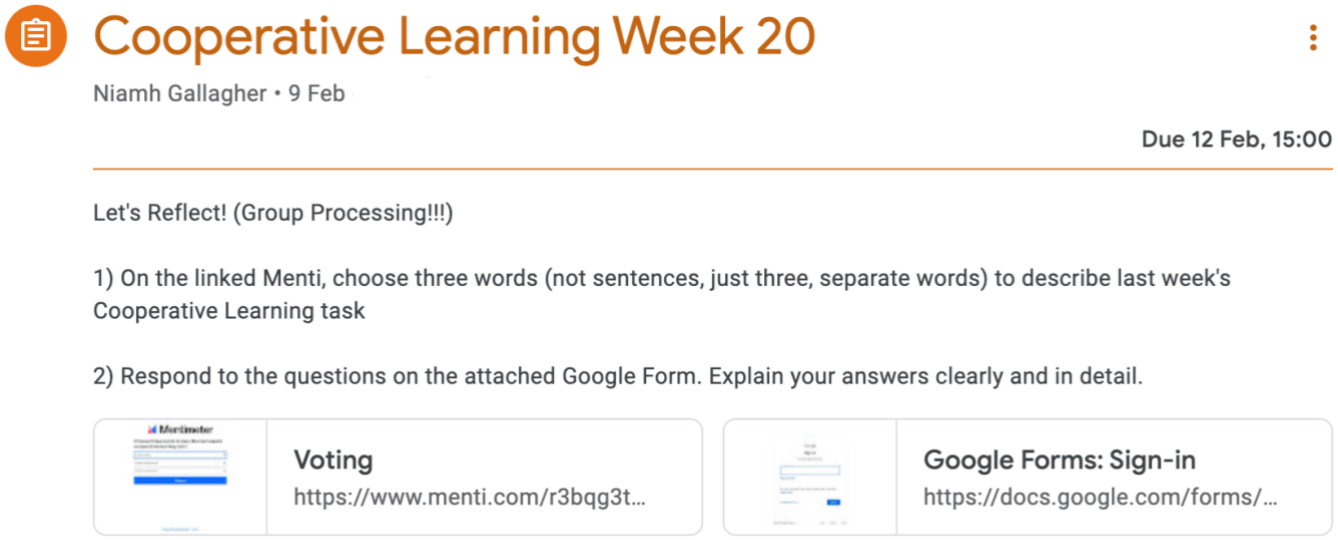
Appendix 2: Google Classroom Instructions Action Cycle 1



Week 2: Introduction of the 5 Essential Elements of Cooperative Learning Using Jamboard



Week 3: Brainstorm of Character Traits



Cooperative Learning Week 20

Niamh Gallagher • 9 Feb

Due 12 Feb, 15:00

Let's Reflect! (Group Processing!!!)

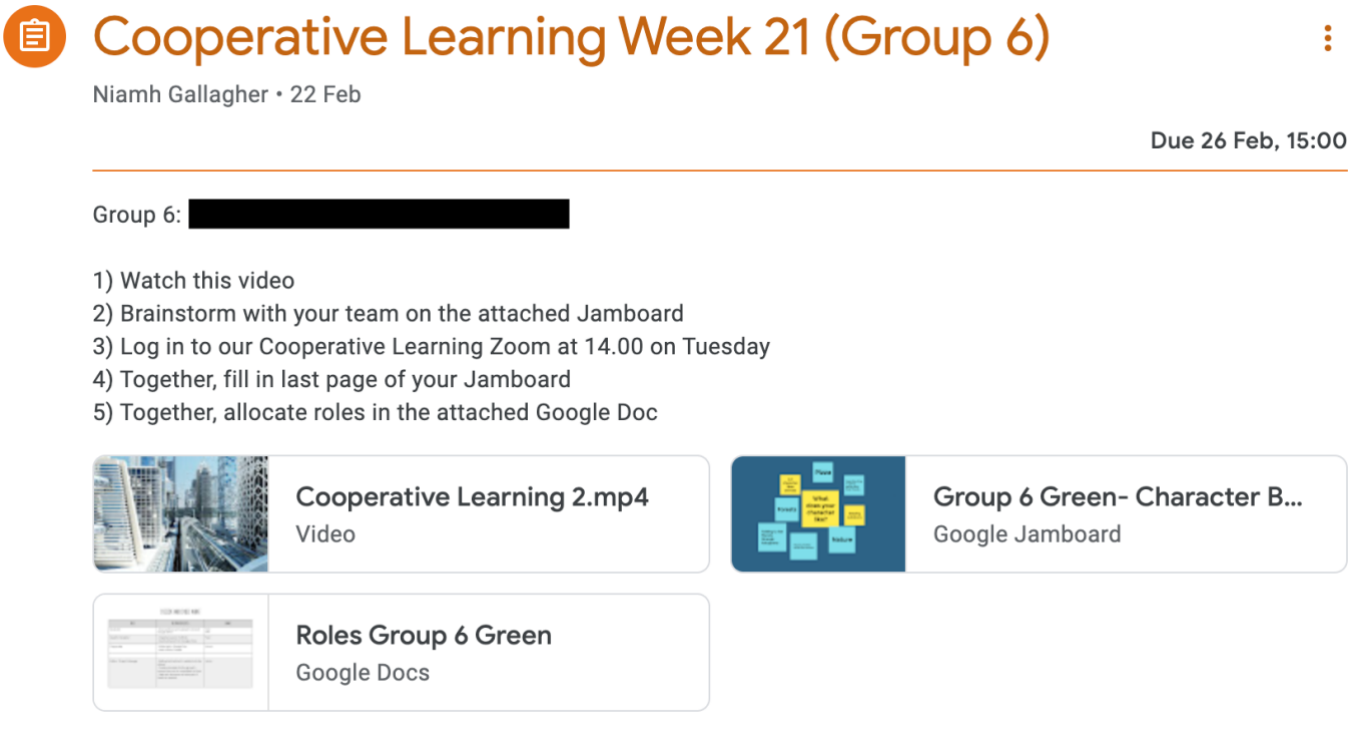
1) On the linked Menti, choose three words (not sentences, just three, separate words) to describe last week's Cooperative Learning task

2) Respond to the questions on the attached Google Form. Explain your answers clearly and in detail.

Voting
https://www.menti.com/r3bqg3t...

Google Forms: Sign-in
https://docs.google.com/forms/...

Week 4: Reflect on Progress



Cooperative Learning Week 21 (Group 6)

Niamh Gallagher • 22 Feb

Due 26 Feb, 15:00

Group 6: [redacted]

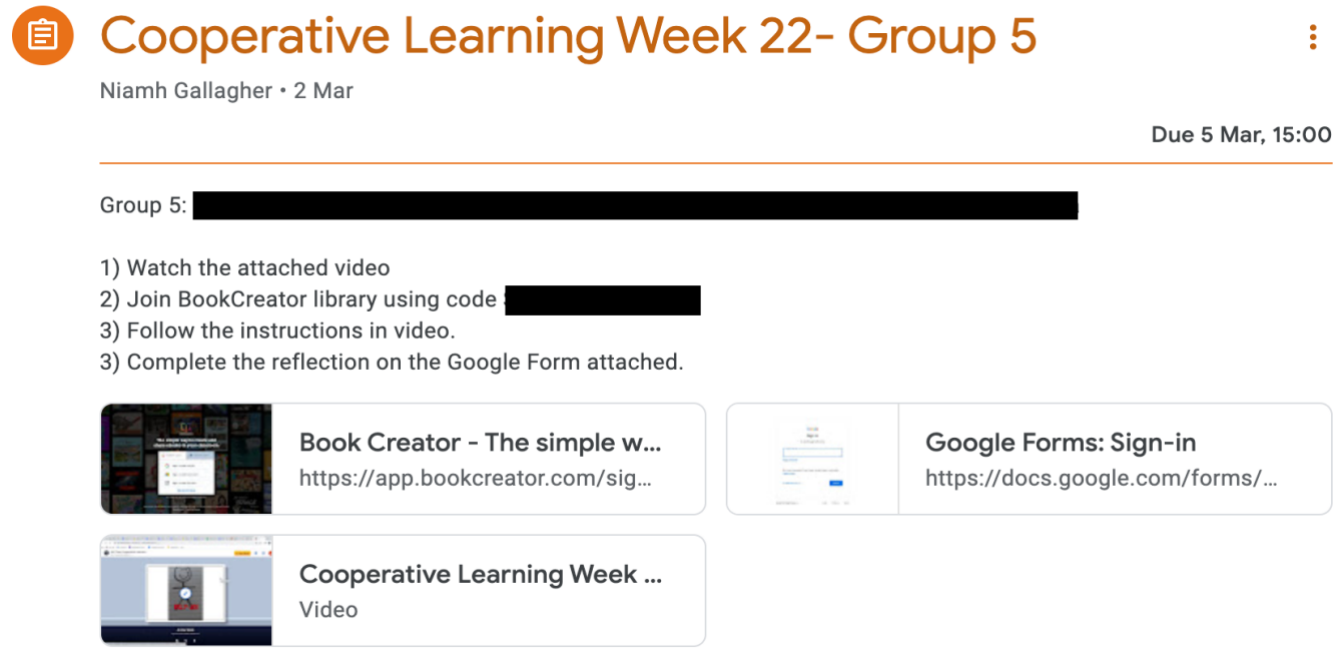
1) Watch this video
2) Brainstorm with your team on the attached Jamboard
3) Log in to our Cooperative Learning Zoom at 14.00 on Tuesday
4) Together, fill in last page of your Jamboard
5) Together, allocate roles in the attached Google Doc

Cooperative Learning 2.mp4
Video

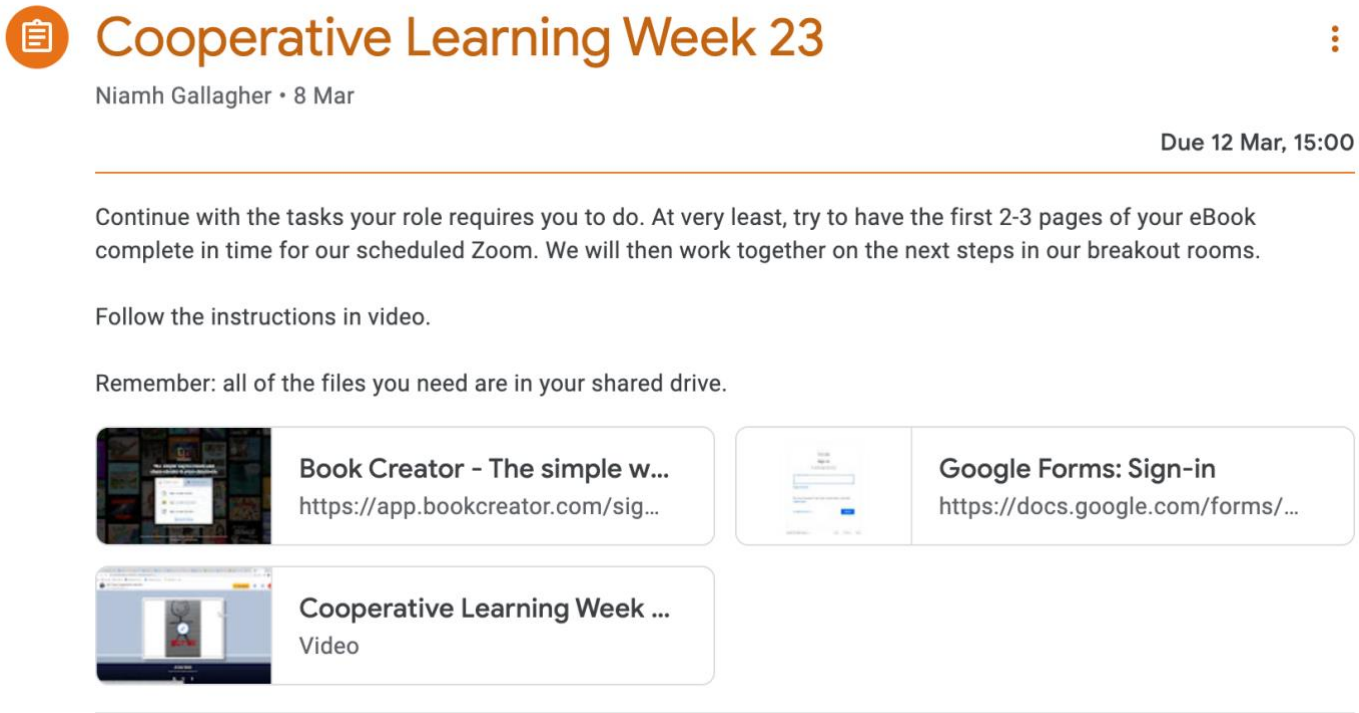
Group 6 Green- Character B...
Google Jamboard

Roles Group 6 Green
Google Docs

Week 5: Choose Roles



Week 6: Create eBook, Reflect on Progress



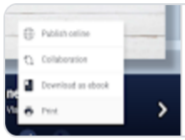
Week 7: Create eBook

Cooperative Learning

Niamh Gallagher • 22 Mar

Due 26 Mar, 12:20

1) Publish your book online (see attached picture)
2) Add link to your finished BookCreator eBook!
3) Submit!



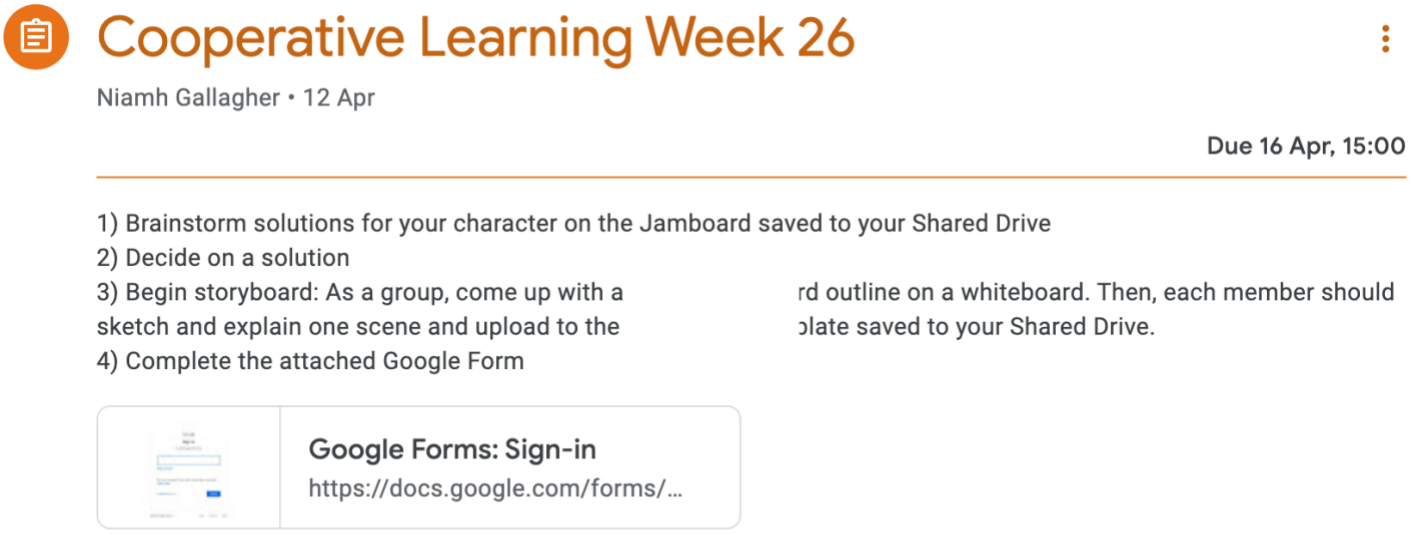
How to Publish eBook.png
Image

Week 8: Create eBook

Appendix 3: Overview of Action Cycle 2

	Task	Digital Tools	Data Collection
Week 1	-Brainstorm ideas for solution -Begin Storyboard -Reflect on Progress	-Google Classroom -Google Drive -Jamboard -Google Slides -Google Forms	-Children's written reflections on Google Forms -Observations -Reflective journal
Week 2	-Create Storyboard -Assign Roles -Outline Schedule -Reflect on Progress	-Google Classroom -Zoom -Interactive Whiteboard -Google Drive -Google Slides -Google Docs -Google Forms	-Audio recording of whole class discussion with children -Children's written reflections on Mentimeter & Google Forms -Observations -Reflective journal
Week 3-6	-Outline task -Create Stop Motion animation	-Google Classroom -Google Drive -Stop Motion Studio	-Observations -Reflective journal
Week 7	-Present animation	-Google Classroom -Mentimeter -Google Form -Zoom	-Audio recording of critical friends' group discussion -Children's written reflections on Google Forms -Observations -Reflective journal
Week 8	-Reflect on progress	-Google Classroom -Zoom	-Audio recording of whole class discussion with children -Critical friends' written reflections on Google Forms -Observations -Reflective journal

Appendix 4: Google Classroom Instructions Action Cycle 2



Cooperative Learning Week 26

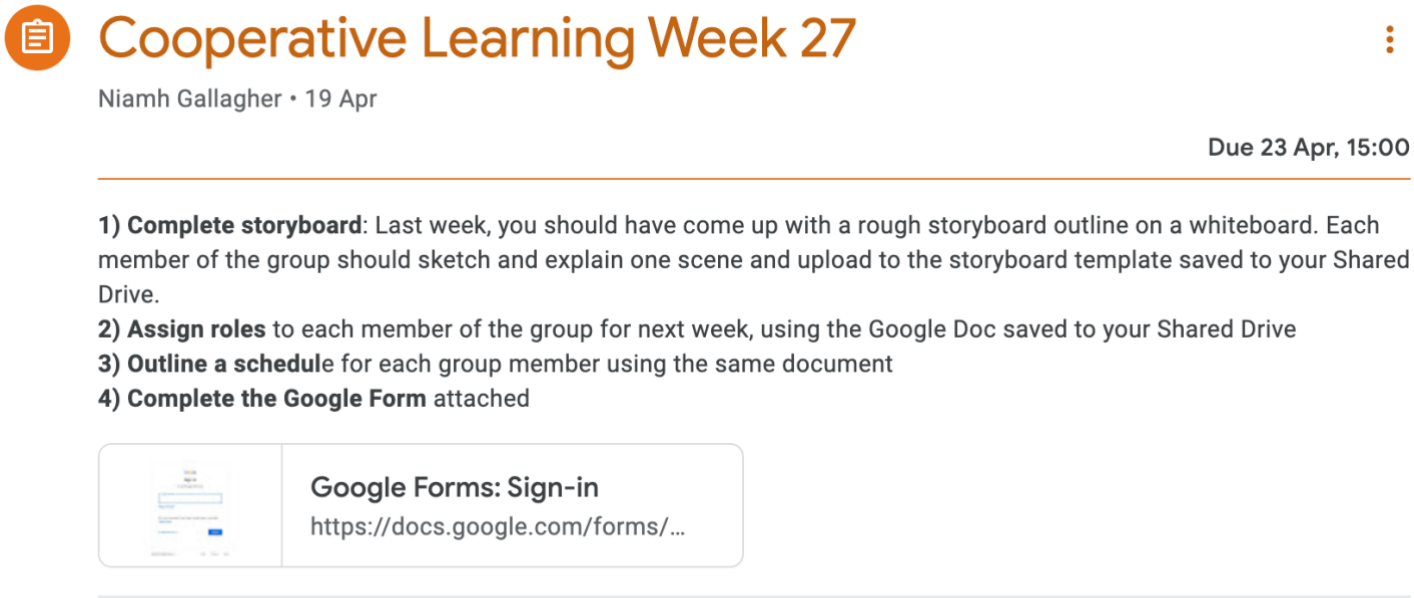
Niamh Gallagher • 12 Apr

Due 16 Apr, 15:00

1) Brainstorm solutions for your character on the Jamboard saved to your Shared Drive
2) Decide on a solution
3) Begin storyboard: As a group, come up with a rd outline on a whiteboard. Then, each member should sketch and explain one scene and upload to the plate saved to your Shared Drive.
4) Complete the attached Google Form

Google Forms: Sign-in
https://docs.google.com/forms/...

Week 1: Brainstorm Ideas for Solution, Reflect on Progress



Cooperative Learning Week 27

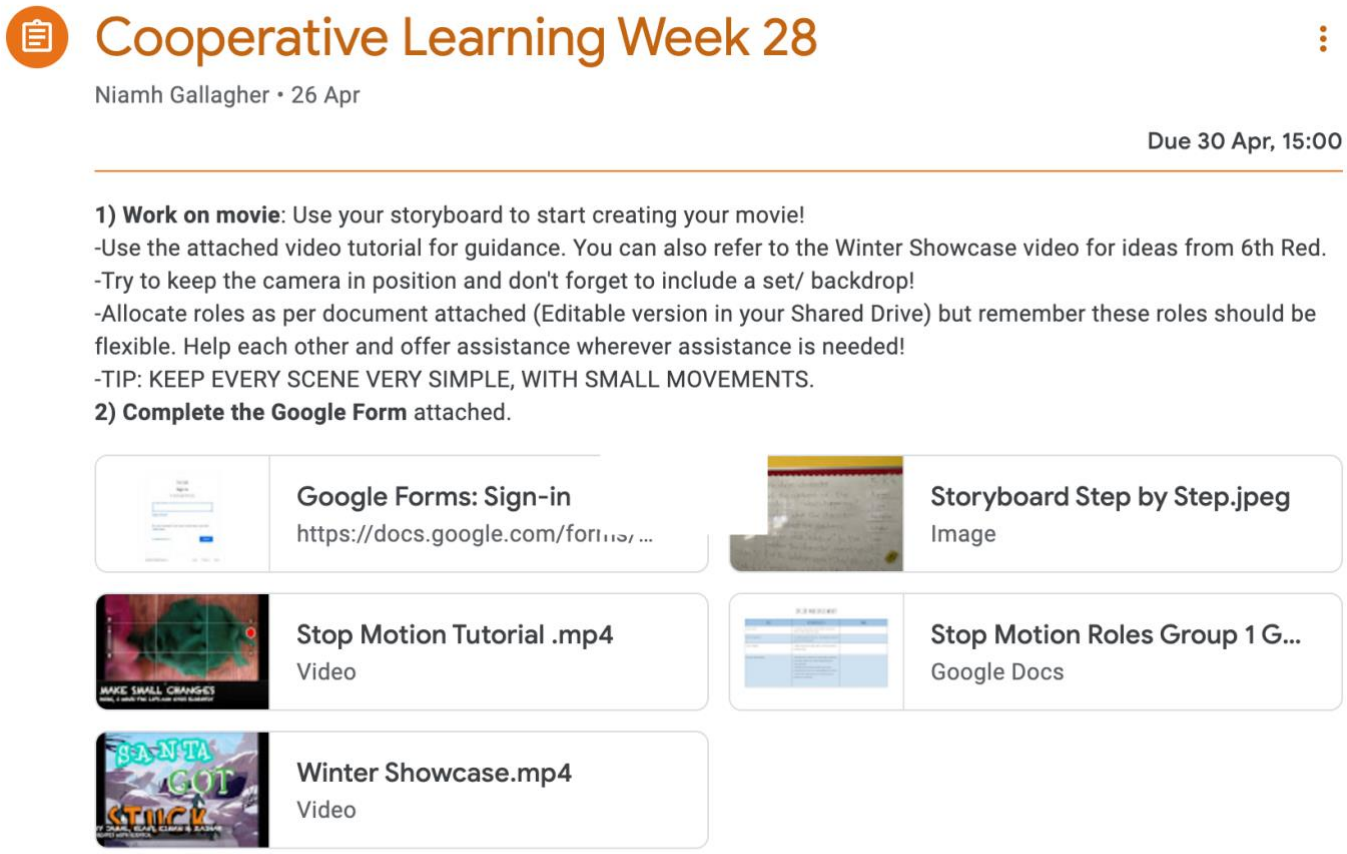
Niamh Gallagher • 19 Apr

Due 23 Apr, 15:00

1) Complete storyboard: Last week, you should have come up with a rough storyboard outline on a whiteboard. Each member of the group should sketch and explain one scene and upload to the storyboard template saved to your Shared Drive.
2) Assign roles to each member of the group for next week, using the Google Doc saved to your Shared Drive
3) Outline a schedule for each group member using the same document
4) Complete the Google Form attached

Google Forms: Sign-in
https://docs.google.com/forms/...

Week 2: Create Storyboard, Assign Roles, Outline Schedule, Reflect on Progress



Week 3: Create Stop Motion Animation, Reflect on Progress

Week 5: Create Stop Motion Animation, Reflect on Progress

Appendix 5: Ethics Statement

Froebel Department of Primary and Early Childhood Education
Master of Education (Research in practice) (MEd)

Ethics Approval for Master of Education (Research in Practice)

Student name:	Niamh Gallagher
Student Number:	20251769
Supervisor:	Prof Marie McLoughlin
Programme:	Master of Education (Research in Practice)
Thesis title:	How Can I Use Digital Technologies to Enhance Cooperative Learning in my Classroom?
Research Question(s):	As above.
Intended start date of data collection:	January 2020
Professional Ethical Codes or Guidelines used:	● Maynooth University Research Ethics Policy ● Maynooth University Research Integrity Policy ● Department of Children and Youth Affairs Guidance for Developing Ethical Research Projects Involving Children

1(a) Research Participants: Who will be involved in this research?

Participants/group (*tick all that apply*)

Early years / pre-school	
Primary school students	✓
Secondary school students	
Young people (aged 16 – 18 years)	
Adults	✓

Provide a brief description of the individuals and their proposed role in your research below:

I will gather data from:

Myself: using reflective journals as well as planning and assessment review documents

My pupils: using students' questionnaires and reflections, students' work, audio files and transcripts.

My Critical Friend Group: using audio files and transcripts from discussions with my partner teacher, SET and SNA.

1(b) Recruitment and Participation/sampling approach: *How will these participants become involved in your research? What type of sampling is involved? Please describe the formal and informal recruitment processes? Please describe the type of participation and level of engagement of participants? Are there gatekeepers and what is their part of sampling process?*

My classroom will define my sample. The children in my class, alongside the adults with whom I work closely, will all be invited to take part. Following approval from the Board of Management, the purpose and nature of my research will be explained clearly and unambiguously to the children. I will clarify that involvement is not obligatory and that participants have the opportunity to opt out at any point in the process, encouraging questions. All children will be presented with an information sheet, which will also be shared with their parents/ guardians. Those willing to participate will need to sign and return student assent forms and parent consent forms alike.

2. Summary of Planned Research (*please indicate anonymised location type, purpose and aims of research, research questions and design, methods to be used and time frame, process of analysis)*

I intend to research how I can use digital technologies to enhance cooperative learning. As a self-study action research project, this investigation will take place in my own classroom and involve participants from 6th class in a vertical, co-educational school that operates under the patronage of Educate Together.

Data will be collected from late January 2021, beginning with a Critical Friends Group discussion. As I begin to analyse this data, I will present the children with an ill-structured, group-worthy task suitable for cooperative learning. Working in partnership with a third level institution in the local area for the second year in a row, the children will be asked to design a character from the future; to explore and suggest solutions for the problems that individuals may face in the year 2100.

Over the course of the 12 week project, I will keep my focus on process over product, looking for ways to enhance each element of cooperative learning using digital technologies and recording my observations in a reflective journal. At intervals, participants will be asked to reflect on their progress and on their working relationships (Gillies, 2016) and to identify, define and solve problems that the group is having working together effectively.(Johnson & Johnson, 1999). I will gather this data using a variety of digital tools including Google Forms, Jamboard, Mentimeter and Padlet, as well as by taking audio recordings of group discussions. The children will reflect on the project as a whole at the end of March, while a discussion

with my critical friends that examines and critiques my inquiry will take place in early April. The qualitative data I gather will be examined using thematic analysis in order to draw conclusions before my research is submitted in September. My claim to new knowledge will require triangulation, and critical friends will play a valuable role in helping me to show the validity of my research.

3. Ethical Issues: Please outline the main ethical issues which may arise while undertaking this research.

All activities will be in line with the school's Internet Acceptable Use, Distance Learning and Data Protection policies and parents will be redirected to these documents in the information sheet attached to consent/ assent forms. While partnership with a local third level institution has been established as part of the school's involvement in a Digital Learning Cluster, continued partnership this year may require contact via Zoom. Zoom sessions with an outside agency is not currently covered in school policies, and this will need to be addressed specifically if and when a meeting is scheduled. Online safety issues may be exacerbated in the event of a school closure. This is explored in more detail below, alongside ethical issues such as potential risk of harm or discomfort, issues created by an imbalance of power, issues around the validity of consent, and those surrounding anonymity, child protection and data storage.

Vulnerability *(minimising risk, discomfort, coping with unforeseen outcomes, can any aspect of the research give rise to any form of harm to participants, including the researcher)?)*

While this research could be perceived as 'low-risk', it is important to recognise that reflection on the failures and successes of a cooperative group could exacerbate existing social tensions, highlighting the status that different members of the group hold with their peers and drawing attention to ability levels. The structure of the cooperative learning activities is key to avoid these risks. Tasks must be 'sufficiently open-ended and multi-faceted to require and benefit from the participation of each member of the group' (Barron & Hammond, 2010: 212). Meanwhile I must ensure to provide a clearly stated group goal, directions that activate positive interdependence, guidance on the expectations for social interactions and communication and clear criteria for success.(Sharan, 2010), I must also ensure to guide, support and intervene as necessary.

Outline the potential for increased risk to participants considering changing circumstances in the school environment because of immediate closure or threat to privacy or anonymity. Consider implications for a change or changes in methodological tools (virtual formats).

The school has a list of target families that will be supplied with devices in the event of a school closure. This means that the children will still be able to work together from home, saving progress to a shared drive, adding to shared documents and maintaining a sense of group interdependence and individual accountability. Equally, the children should be able to reflect on their group's progress in much the same way as they would in the classroom. However, the social behaviours that enable promotive interaction are different in an online environment and these will have to be taught explicitly over Digital Learning Platforms and

supported with guidelines. Parents will be directed to the school's Distance Learning Policy at the start of the research process and again in the event of a school closure. \

Power dynamics *(between researcher-participants, amongst participants, insider-research, reflexivity, gatekeepers, working with your colleagues, working with students, etc)*:

This research takes place in the classroom setting and overlaps with what the students would ordinarily be required to do. This makes it difficult for children to choose not to participate for two reasons:

1. It may be difficult to ascertain at which point research is taking place (Nolen & Putten, 2007)
2. They may feel pressure from their peers to participate (DCYA, 2012) or, indeed, from their teacher

Furthermore, the power imbalance between me, as teacher, and the participants, as my students, could lead to acquiescence. As I am teaching a 6th class group, an open discussion about the power dynamics in the classroom is age-appropriate and could help to mitigate these issues. As mentioned above, power imbalances will also exist within cooperative groups. My own subjectivity in how I assist the children in navigating these disparities must also be addressed. My critical friends will be called upon to help me analyse my emotional and interpersonal responses as part of the data. The personal bond I share with my colleagues, too, must be acknowledged. A group of three critical friends will help to ensure that dialogue in the group is deepened by combined pedagogical knowledge, but a safe environment must also be cultivated in which critique and challenges to my assumptions are welcomed (Blake & Gibsons, 2020).

Informed consent and assent *(for participants - and guardians where appropriate. Please also note* any *other approvals that may be required from other bodies (i.e. Board of Management.):*

Following approval from the Board of Management, informed assent and consent will be sought from children and parents respectively. The aims, methods and potential outcomes of the research will be discussed in class to allow the children time to assimilate the information in the explanation sheet provided, ask questions and consult with others before deciding whether to assent. It will be clarified that this assent can be withdrawn at any time during the process and that a decision to do so will override the consent given by a parent. The letter attached to the consent form for parents/ guardians will outline the purpose and nature of my research and direct them to discuss the information sheet with their child before giving their consent. My email address will be supplied so that any queries can be addressed (DCYA, 2012).

Consider if consent of participants may need to include a list of any new scenarios/situations that may
be required for data collection activity in light of school closures or short-term illness of school members (teachers/SNA) and how this may impact the research. Outline below;

In the event of a school closure, synchronous reflection sessions will have to take place over Zoom so that discussion is not limited to a back and forth of comments on Google Classroom. Some students, after all, may be daunted by a medium of communication that 'demands keyboard skills and good standards of written language, and also requires the motivation to participate without the support of a live social context' (Beetham & Sharpe, 2013: 37). This means that Zoom sessions may need to be recorded. If the need arises, permission for these recordings will be sought via Aladdin Connect. Critical Friend Group discussions will take place over Zoom if it is not possible to conduct a face-to-face session. Failing that, discussions will continue in the absence of one or two members of the group. In the event that all three members are unavailable, I will defer scheduled meetings as appropriate.

Sensitivity *(topics that may be potentially sensitive, intrusive or stressful, have you considered what to do in relation to dealing with the aftermath of a sensitive disclosure? how do you intend to deal with unexpected outcomes?)*

While the research topic itself is not sensitive at face value, the potential of a sensitive disclosure must always be considered. Confidentiality cannot be promised if a child protection issue arises and parents will be directed to the school's Child Safeguarding Statement when obtaining consent. Such disclosures will be reported to the Designated Liaison Person and Tusla, as necessary.

Data storage *(where will the findings be stored; will they be published? And by whom?)*

All data collection, storage and retention will be in line with the Maynooth University Research Integrity Policy, General Data Protection Regulations and the New Data Protection Bill 2018. Primary data will be anonymised where possible and stored safely for a period of 10 years, with remote access to digital files secured using strong passwords that require two-step verification. No research findings will be published publicly before the final thesis has been subject to assessment by staff at Maynooth University and external examiners.

Ensure you have read University Ethics guidelines for Human Research and GDPR (General Data Protection Regulation) related documentation to address the above questions on data.

References

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Beetham, H., & Sharpe, R. (2013). Rethinking Pedagogy for a Digital Age: Designing for 21st century learning: Routledge.

Blake, J. & Gibson, A. (2020): Critical Friends Group protocols deepen conversations in collaborative action research projects, Educational Action Research. Available from: https://doi.org/10.1080/09650792.2020.1717568 Accessed 28th September 2020)

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Attachments
Please attach, where available and applicable, information letters, consent forms and other materials that will be used to inform potential participants about this research.

Declaration *(Please sign and date)*

Signed 

'I confirm that to the best of my knowledge this is a full description of the ethical issues that may arise in the course of undertaking this research.' If any of the conditions of this proposed research change, I confirm that I will re-negotiate ethical clearance with my supervisor.

Appendix 6: Letter to Board of Management

Maynooth University Froebel Department of
Primary and Early Childhood
Education

Dear [redacted],

I am currently working towards a Master's qualification, studying Research in Practice at Maynooth University. This course allows teachers to improve and develop their practice through cycles of reflection, planning and action. My research will investigate how digital technologies can be used to facilitate cooperative learning activities. I would like to ask for the Board of Management's permission to engage in this research project with my class. I have attached an information sheet that I intend to share with the children and their parents/ guardians in order to outline the purpose and nature of my research and obtain informed consent.

I intend to carry out research in the classroom by incorporating technology into an open-ended group project. The children will use their new tablets to work cooperatively on creating a short video and accompanying eBook. Access to the full range of apps available on GSuite for Education will allow the children to collaboratively edit texts and save files to a shared drive, facilitating the creation of brainstorms and learning logs. Data will be collected using observations, a daily teacher journal and the children's work. At intervals, the children will be asked to reflect on their progress and on their working relationships and to identify, define and solve problems that the group is having working together effectively. Reflections are an essential part of cooperative learning. Recorded using a variety of digital tools including Google Forms, Jamboard, Mentimeter and Padlet and coupled with audio recordings of group discussions, these reflections will also become a source of data. I will use all data to analyse the impact that digital technologies are having on the cooperative learning process and to question how I might improve my own teaching. All activities will be in line with the school's Internet Acceptable Use, Data Protection and Child Safeguarding guidelines.

Neither children's names nor the name of the school will be included in the thesis that I will write at the end of the research. Children will be allowed to withdraw from the research process at any stage. All information will be confidential, with data stored securely and destroyed in accordance with university guidelines. The research will not be carried out until approval is granted by the Froebel Department of Primary and Early Childhood Education.

If you have any queries on any part of this research project feel free to contact me by email at [redacted]

Kindest regards,

Niamh Gallagher

ndix 7: Letter to Parents/ Guardians

Maynooth University
National University of Ireland Maynooth

Maynooth University Froebel Department of Primary and Early Childhood Education

Dear Parent(s)/Guardian(s),

I am currently working towards a Master's qualification, studying Research in Practice at Maynooth University. This course allows teachers to improve and develop their practice through cycles of reflection, planning and action. My research will investigate how digital technologies can be used to facilitate cooperative learning activities. I would like to invite you and your child to give permission for him/her to take part in this project. I have attached an information sheet that should help you and your child to understand the nature of the research.

I intend to carry out research in the classroom by incorporating technology into an open-ended group project. The children will use their new tablets to work cooperatively on creating a short video and accompanying eBook. Access to the full range of apps available on GSuite for Education will allow the children to collaboratively edit texts and save files to a shared drive, facilitating the creation of brainstorms and learning logs. Data will be collected using observations, a daily teacher journal and the children's work. At intervals, the children will be asked to reflect on their progress and on their working relationships and to identify, define and solve problems that the group is having working together effectively. Reflections are an essential part of cooperative learning. Recorded using a variety of digital tools including Google Forms, Jamboard, Mentimeter and Padlet and coupled with audio recordings of group discussions, these reflections will also become a source of data. If the school building should remain closed beyond February 1st, discussions on Zoom may be recorded, but only with cameras off. Should I intend to do this, I will notify you via Aladdin in advance. I will use all data to analyse the impact that digital technologies are having on the cooperative learning process and to question how I might improve my own teaching. All activities will be in line with the school's Internet Acceptable Use, Data Protection and Child Safeguarding guidelines.

Neither children's names nor the name of the school will be included in the thesis that I will write at the end of the research. Children will be allowed to withdraw from the research process at any stage. All information will be confidential, with data stored securely and destroyed in accordance with university guidelines. The research will not be carried out until approval is granted by the Froebel Department of Primary and Early Childhood Education.

If you have any queries on any part of this research project feel free to contact me by email at [redacted]

Kindest regards,

Niamh Gallagher

Appendix 8: Information Sheet

Maynooth University Froebel Department of
Primary and Early Childhood
Education

Roinn Froebel Don Bhun- agus
Luath- Oideachas
Ollscoil Mhá Nuad.

INFORMATION SHEET

Who is this information sheet for?

This information sheet is for you, the pupils of 6th Class Green, and your parents/ guardians.

What is this Action Research Project about?

I am working towards a Master of Education in the Froebel Department of Primary and Early Childhood, Maynooth University. As part of this course, teachers are required to conduct an 'action research project', examining an area of their own teaching and taking action to make it better. Data is generated using observations, reflective notes and group discussions. The teacher is then required to produce a thesis documenting this action research project.

What is the research question?

- How Can I Use Digital Technologies to Facilitate Cooperative Learning?

What does this mean?

Cooperative learning is the learning that takes place within a small group of students who rely on each other to achieve a group goal. I want to figure out how we can make cooperative learning better using our new tablets! Being able to work effectively as a group is a really important skill. I want to see if digital technology can help us to fine-tune our ability to work as a cooperative team. To do so, I am going to incorporate digital technologies into an open-ended group project and record the impact that they have on cooperative learning.

Our project will involve creating a short video and an accompanying eBook. We will use some apps with which you are already familiar, including FilmMaker, Stop Motion Studio and BookCreator. We will also use GSuite for Education so that you can collaboratively edit

texts and save files to your shared drive. Reflecting on your group's progress is an essential part of cooperative learning and we will use digital tools such as Google Forms, Jamboard, Mentimeter and Padlet to record our thoughts and generate discussion.

What sorts of data collection methods will be used?

- I will take notes of what I observe in class
- I will reflect on these observations in my reflective journal
- I will ask you, the students, to reflect on your progress and on your working relationships with your group using the digital tools mentioned above.
- I will also record audio of group discussions, but will always inform you before I do so.

What if the school building has to remain closed for a little longer?

If the school building remains closed beyond the first of February, I will start my research in our online classroom. You will work on a group task from your individual homes, sharing your progress to a shared drive. I will still gather your reflections on the task using Google Forms, Jamboard, Mentimeter and Padlet. I will also record the audio of group discussions we have on Zoom, with permission from you and your parents.

Who else will be involved?

The study will be carried out by me, Niamh, as part of the Master of Education course in the Froebel Department of Primary and Early Childhood Education. [redacted] and [redacted] are going to be my 'critical friends.' This means that they will help me with ideas of how to improve what we are doing by giving me constructive feedback. The thesis will be submitted for assessment to the module leader Dr Bernadette Wrynn and will be examined by the Froebel Department staff in Maynooth University. External examiners will also access the final thesis.

Importantly, I will not use anybody's name or even the name of the school in the thesis. The data I gather will only be used for the purpose of the research as part of the Master of Education in the Froebel Department, Maynooth University and will be stored safely and later destroyed in accordance with University guidelines.

What are you being asked to do?

You are being asked to take part in a group project in which you must create a video and an eBook. You are being asked to work with the other members of your group to brainstorm ideas, to take on responsibilities within the group and to keep a record of your progress. You are also being asked to reflect on how your team is working together honestly so that I can use your feedback to make improvements to the cooperative learning activities that I organise in our classroom.

If you and your parents are happy for you to participate in this research, please return the attached consent form. You can change your mind and withdraw your participation at any time.

Appendix 9: Board of Management Consent Form

Maynooth University Froebel Department of Primary and Early Childhood Education

Roinn Froebel Don Bhun- agus Luath- Oideachas Ollscoil Mhá Nuad

BOARD OF MANAGEMENT CONSENT FORM

The Board of Management has read the information provided in the attached letter and information sheet and all of our questions have been answered. We are happy for this research to go ahead.

Chairperson's Signature _____

Principal's Signature _____

Date: _____

Appendix 10: Parent/ Guardian Consent Form

Consent form

I have read the information provided in the attached letter and information sheet and all of my questions have been answered. I voluntarily agree to the participation of my child in this study.

*Required

1. Child's Name: *

2. Parent's Name *

Appendix 11: Children's Assent Form

Assent form

I have read the information sheet provided/ watched the video and am happy to be involved in this project

*Required

1. Name *

Appendix 12: Rubric

	1	2	3
POSITIVE INTERDEPENDENCE	I feel that I could have done this project without any input from the rest of the team.	I feel like the rest of the team helped me to do a better job than I could on my own.	I relied on the other members of my team to complete the task.
INDIVIDUAL ACCOUNTABILITY	I felt that the rest of the team would be able to proceed without my input.	I did my part of the work because it was assigned to me by the teacher.	I did my best work, not only because it was assigned to me by the teacher, but because I realised that my input or lack thereof would have consequences for all of the other members of the team.
PROMOTIVE INTERACTION	My group did not really help each other to achieve the task.	Some of my group members offered help, feedback and guidance.	My group supported each other as best they could; helping to motivate the team to do our best.
APPROPRIATE SOCIAL SKILLS	My group did not communicate clearly or listen to each other's ideas.	My group communicated with each other, listened to each other and considered the perspective of other team members.	My group communicated with each other, listened to each other and considered the perspective of other team members. I felt comfortable to state ideas freely without fear of unkind comments and I felt that decision-making was fair and democratic.
GROUP PROCESSING	I did not engage in any reflection on how well I was working with the others in my group.	Through reflection, I was able to identify problems that my group was having working together.	Through reflection and feedback from other group members, I was able not only to identify problems that my group was having working together, but to set improvement goals that would allow me to solve them.

Appendix 13: Open-Ended Questionnaires- Children

Cooperative Learning 1

Let's reflect on last week's learning task

*Required

1. What is your name?

2. In order to complete this task, you needed to do your part of the work and you had to rely on the other people in the group to do theirs. How did that make you feel? Explain your answer. *

3. Would it have been easier or more difficult to complete this task if we were together, in the classroom? Explain your answer. *

4. Did you experience promotive interaction in your group? If so, give examples. If not, consider why. *

5. Do you think the social skills you need to interact with each other online are different to those you need in person? Explain your answer. *

6. What went well for your group? Explain your answer. *

7. Would you do anything differently next time you have a group task to complete from home? Explain your answer. *

Cooperative Learning 2

Let's reflect on how we are working as a group

*Required

1. What is your name?

2. Last week, you were asked to brainstorm ideas on a Jamboard. What worked well about this task? What didn't work so well? *

3. We hosted a session on Zoom to allow you time to discuss ideas with your group. What worked well about this session? What didn't work so well? *

4. This week, everyone is taking on a different role in the group. Is this helpful? *

5. Is this project something that you are enjoying/ looking forward to working on? Why/ why not? *

6. What is difficult about this week's task and why? *

7. What would make this week's task easier and how? *

Cooperative Learning 3

Having completed your brainstorm and started your storyboard, let's take some time to reflect on how well you are working as a group!

*Required

1. What is your name?

2. Positive interdependence means that everybody's contribution to the group is necessary/ important. Was positive interdependence evident in your group during this week's task? Explain. *

3. Individual accountability in cooperative learning means that each student must take responsibility for their own actions and for their contributions to the group. Was individual accountability evident in your group during this week's task? Explain. *

4. Promotive interaction means that you are interacting with others in order to help them. Was promotive interaction evident in your group during this week's task? Explain. *

5. In order for successful promotive interaction to take place, students must have the appropriate social skills. This means that group members must communicate clearly, listen carefully and act kindly and respectfully towards others. Were appropriate social skills evident in your group during this week's task? Explain. *

6. Did using your tablets/ Jamboard/ Google Drive help you to achieve positive interdependence, individual accountability, promotive interaction or appropriate social skills? Which one(s)? How did using technology help? *

Cooperative Learning 4

Having completed your storyboard and assigned roles, let's take some time to reflect on how well you are working as a group!

*Required

1. What is your name?

2. Do you feel that everybody participated in and contributed to this week's task? Explain. *

3. Turn to your partner. Did they answer the last question differently? What were those differences? *

4. Did using tablets help group members to participate? Explain. *

5. Turn to your partner. Did they answer the last question differently? What were those differences? *

6. Do you know what your role is and what you need to do next? Did/ could digital tools (Gsuite etc) help you to be clearer on your responsibilities? Explain. *

7. Turn to your partner. Did they answer the last question differently? What were those differences? *

8. Promotive interaction means that you are interacting with others in order to help them. Were you happy with the promotive interaction in your group? Explain. *

9. Turn to your partner. Did they answer the last question differently? What were those differences? *

10. What do you think you need to work on as a team? How can using the tablets/ digital tools help you? *

11. Turn to your partner. Did they answer the last question differently? What were those differences? *

Cooperative Learning 5

*Required

1. What is your name?

2. What did you enjoy the most about starting your movie with your group this week? Explain. *

3. Did you work well together as a team? Explain. *

4. Did you struggle with anything this week? Elaborate. *

5. Did using the tablets/ digital tools help you to work together as a team? Explain. *

Cooperative Learning 6

Having started your stop motion animation, let's take some time to reflect on how well you are working as a group!

*Required

1. What is your name?

2. Positive interdependence means that everybody's contribution to the group is necessary/ important. Was positive interdependence evident in your group during this week's task? Explain. *

3. Individual accountability in cooperative learning means that each student must take responsibility for their own actions and for their contributions to the group. Was individual accountability evident in your group during this week's task? Explain. *

4. Promotive interaction means that you are interacting with others in order to help them. Was promotive interaction evident in your group during this week's task? Explain. *

5. In order for successful promotive interaction to take place, students must have the appropriate social skills. This means that group members must communicate clearly, listen carefully and act kindly and respectfully towards others. Were appropriate social skills evident in your group during this week's task? Explain. *

6. Did using your tablets/ Jamboard/ Google Drive help you to achieve positive interdependence, individual accountability, promotive interaction or appropriate social skills? Which one(s)? How did using technology help? *

Cooperative Learning 7

Let's take some time to reflect on how well you are working as a group!

*Required

1. What is your name?

2. Do you feel that everybody participated in and contributed to this week's task? Explain. *

3. Turn to your partner. Did they answer the last question differently? What were those differences? *

4. Did you know what your role was and what you needed to do? Did/ could digital tools (Gsuite etc) help you to be clearer on your responsibilities? Explain. *

5. Turn to your partner. Did they answer the last question differently? What were those differences? *

6. Did the nature of the task (stop motion) help to motivate you? *

7. Turn to your partner. Did they answer the last question differently? What were those differences? *

8. Promotive interaction means that you are interacting with others in order to help them. Were you happy with the promotive interaction in your group? Explain. *

9. Turn to your partner. Did they answer the last question differently? What were those differences? *

10. Do you think that everybody in the group got a chance to be heard and share their opinions and ideas? *

11. Turn to your partner. Did they answer the last question differently? What were those differences? *

12. What do you think you need to work on as a team? How can using the tablets/ digital tools help you? *

13. Turn to your partner. Did they answer the last question differently? What were those differences? *

14. Have you enjoyed working on this project since you've been back in the school building? Explain. *

15. How did technology help you to work as a team? *

Appendix 14: Open-Ended Questionnaires- Critical Friends

Critical Friends Feedback 1

*Required

1. Positive interdependence means that everybody's contribution to the group is necessary/ important. Was positive interdependence evident in the groups during this task? Explain. *

2. Individual accountability in cooperative learning means that each student must take responsibility for their own actions and for their contributions to the group. Was individual accountability evident in the groups during this task? Explain. *

3. Promotive interaction means that you are interacting with others in order to help them. Was promotive interaction evident in the groups during this task? Explain. *

4. In order for successful promotive interaction to take place, students must have the appropriate social skills. This means that group members must communicate clearly, listen carefully and act kindly and respectfully towards others. Were appropriate social skills evident in your group during this task? Explain. *

5. Did using BookCreator/ Jamboard/ Google Drive help groups to achieve positive interdependence, individual accountability, promotive interaction or appropriate social skills? Which one(s)? How did using technology help? *

Critical Friends Feedback 2

*Required

1. Phase 1 of this project was, for the most part, completed while the children were working from home. Phase 2 (the animation) was completed in school. Did you notice any difference in the children's motivation/ attitude towards the task? Can you suggest any reasons for this? *

2. In your opinion, did the nature of the task (creating an animation using digital tools) help or hinder the cooperative learning process? Explain. *

3. Positive interdependence means that everybody's contribution to the group is necessary/ important. Was positive interdependence evident in the groups during this task? Explain. *

4. Individual accountability in cooperative learning means that each student must take responsibility for their own actions and for their contributions to the group. Was individual accountability evident in the groups during this task? Explain. *

5. Promotive interaction means that you are interacting with others in order to help them. Was promotive interaction evident in the groups during this task? Explain. *

6. In order for successful promotive interaction to take place, students must have the appropriate social skills. This means that group members must communicate clearly, listen carefully and act kindly and respectfully towards others. Were appropriate social skills evident in your group during this task? Explain. *

7. Group processing requires students to reflect on their progress and on how well they are working with the others in their group and to identify and solve any problems that the group is having working together effectively. Was group processing evident in the groups during this task? Explain. *

8. Did using digital technologies help groups to achieve positive interdependence, individual accountability, promotive interaction or appropriate social skills? Which one(s)? How did using technology help? *

Appendix 15: Example of Thematic Analysis Procedure

Colour-Coded Data Sample: Basic Themes	**Basic Themes**
Q: Did using your tablets/ Jamboard/ Google Drive help you to achieve positive interdependence, individual accountability, promotive interaction or appropriate social skills? Which one(s)? How did using technology help?	Positive Peer Pressure
P1: *We already knew where everything was.*	Group Dynamic
P2: Using our tablets in my opinion I think helped a lot, it helped us in many different ways.	Peer Support
P3: Yes, since it was jamboard people could easily share and edit ideas, google drive made things very accesible, *because of google drive people could easily access the jamboard.*	Different Perspectives
P4: I think using our tablets , Jamboard and Google Drive did help a lot with everything in general and especially Individual Accountability because i think writing your own ideas digitally and clearly so other people were able to see YOUR OWN ideas was A HUGE PART THE TABLETS played in.	Communication
P5: Yes they helped us communicate	Teacher Interference
P6: It helped with individual accountability.	Decision-Making
P7: Yes it did help cause sometimes people dont tell their ideas cause they might be shy etc. people were able to express themselves and overall for me it felt less stressful.	Record of Progress
P8: For me Jamboard was quite useful because that's where we brainstormed our ideas and created the main idea for our character	Restrictions
P9: Technology helped by making our work shorter and easier to do.	Motivation
P10: yes they did with jamboard we were able to interact with our team mates.	Asynchronous Learning
P11: I personally found it hard to communicate when we were in lockdown but now that we are in school it's much easier.	Frustration
P12: it was kind of hard using jamboard because our jamboard was deleting	Stress
P13: Using technology heled a lot because we could communicate and work together	Equity
P14: yes thecnology helped us well it is a little the same when we are doing on paper like with jamboard we added sticky notes to the slide and in real life we aould add stickey notes to the poster .	Doubt
P15: I feel like using technology during project work is easy just because doing it on paper is harder, because youre hands gee tired from writing. Jamboard and using the Tablets helped a lot!	*Scaffolding*
P16: Technology helped because we could do everything faster and everything was more organised.It helped achieve all of the above.	
P17: yes because on paper its really hard work but on computer it way easier.	

Colour-Coded Data Sample: Sub-Themes	**Sub-Themes**
Q: Did using your tablets/ Jamboard/ Google Drive help you to achieve positive interdependence, individual accountability, promotive interaction or appropriate social skills? Which one(s)? How did using technology help? P1: We already knew where everything was. P2: Using our tablets in my opinion I think helped a lot, it helped us in many different ways. P3: Yes, since it was jamboard people could easily share and edit ideas, google drive made things very accesible, because of google drive people could easily access the jamboard. P4: I think using our tablets , Jamboard and Google Drive did help a lot with everything in general and especially Individual Accountability because i think writing your own ideas digitally and clearly so other people were able to see YOUR OWN ideas was A HUGE PART THE TABLETS played in. P5: Yes they helped us communicate P6: It helped with individual accountability. P7: Yes it did help cause sometimes people dont tell their ideas cause they might be shy etc. people were able to express themselves and overall for me it felt less stressful. P8: For me Jamboard was quite useful because that's where we brainstormed our ideas and created the main idea for our character P9: Technology helped by making our work shorter and easier to do. P10: yes they did with jamboard we were able to interact with our team mates. P11: I personally found it hard to communicate when we were in lockdown but now that we are in school it's much easier. P12: it was kind of hard using jamboard because our jamboard was deleting P13: Using technology heled a lot because we could communicate and work together P14: yes thecnology helped us well it is a little the same when we are doing on paper like with jamboard we added sticky notes to the slide and in real life we aould add stickey notes to the poster . P15: I feel like using technology during project work is easy just because doing it on paper is harder, because youre hands gee tired from writing. Jamboard and using the Tablets helped a lot! P16: Technology helped because we could do everything faster and everything was more organised.It helped achieve all of the above. P17: yes because on paper its really hard work but on computer it way easier.	The Benefit of Multiple Perspectives The Barriers to Dialogue Presented by the Restrictions of Covid The Affordances of Digital Tools to Facilitate Dialogue The Necessity of Digital Tools for Scaffolding Learning The Restrictions of the Pandemic as an Impediment to Autonomy A Sense of Autonomy as Key to Motivation

Colour-Coded Data Sample: Organising Themes	Organising Themes
Did using your tablets/ Jamboard/ Google Drive help you to achieve positive interdependence, individual accountability, promotive interaction or appropriate social skills? Which one(s)? How did using technology help? P1: We already knew where everything was. P2: Using our tablets in my opinion I think helped a lot, it helped us in many different ways. P3: Yes, since it was jamboard people could easily share and edit ideas, google drive made things very accesible, because of google drive people could easily access the jamboard. P4: I think using our tablets , Jamboard and Google Drive did help a lot with everything in general and especially Individual Accountability because i think writing your own ideas digitally and clearly so other people were able to see YOUR OWN ideas was A HUGE PART THE TABLETS played in. P5: Yes they helped us communicate P6: It helped with individual accountability. P7: Yes it did help cause sometimes people dont tell their ideas cause they might be shy etc. people were able to express themselves and overall for me it felt less stressful. P8: For me Jamboard was quite useful because that's where we brainstormed our ideas and created the main idea for our character P9: Technology helped by making our work shorter and easier to do. P10: yes they did with jamboard we were able to interact with our team mates. P11: I personally found it hard to communicate when we were in lockdown but now that we are in school it's much easier. P12: it was kind of hard using jamboard because our jamboard was deleting P13: Using technology heled a lot because we could communicate and work together P14: yes thecnology helped us well it is a little the same when we are doing on paper like with jamboard we added sticky notes to the slide and in real life we aould add stickey notes to the poster . P15: I feel like using technology during project work is easy just because doing it on paper is harder, because youre hands gee tired from writing. Jamboard and using the Tablets helped a lot! P16: Technology helped because we could do everything faster and everything was more organised.It helped achieve all of the above. P17: yes because on paper its really hard work but on computer it way easier.	The Importance of Dialogue The Significance of Autonomy

Appendix 16: Themes, Sub-Themes and 'Sub-Sections'

Theme 1	**The Importance of Dialogue**
Sub-Theme	The Benefit of Multiple Perspectives
Sub-Section	*Multiple Perspectives: An Open-Ended Task*
	Multiple Perspectives: The Online Nature of the Task
	Multiple Perspectives: Explicit Teaching of Skills as a Requirement
Sub-Theme	The Barriers to Dialogue Presented by the Restrictions of Covid
	Barriers to Dialogue: An Over-Reliance on Digital Tools
	Barriers to Dialogue: The Emotional Toll
	Barriers to Dialogue: The Artificial Social Interaction of Online Group Work
Sub-Theme	The Affordances of Digital Tools to Facilitate Dialogue
	Digital Tools: Enhanced Participation
	Digital Tools: Traceability of Ideas
	Digital Tools: An Aid to In-Person Learning
	Digital Tools: Group Processing

Theme 2	**The Significance of Autonomy**
Sub-Theme	The Necessity of Digital Tools for Scaffolding Learning
Sub-Section	*Scaffolding: A Requirement for Open-Ended Tasks*
	Scaffolding: Using a Variety of Digital Tools
Sub-Theme	The Restrictions of the Pandemic as an Impediment to Autonomy
	Scaffolds: To Support or Stifle?
	Restrictions: Teacher Power v Pupil Agency
	Restrictions: Social Loafing in Asynchronous Learning
	Restrictions: Barriers to Physical Movement
Sub-Theme	Autonomy as Key to Motivation
	Autonomy and Motivation: The Nature of the Task
	Structure and Autonomy: Striking the Right Balance
	A Lack of Novelty
	A Lack of Choice over Group Members and Digital Tools
	Digital Tools as a Panacea for Demotivation: Challenging my Own Assumptions

Appendix 17: Themes, Sub-Themes and the Link to my Research Questions

How Can I Use Digital Technologies to Facilitate Cooperative Learning in my Classroom?		
Theme	Sub-Theme	Research Question
The Importance of Dialogue	The Benefit of Multiple Perspectives	How does the nature of the task affect the cooperative learning process?
	The Barriers to Dialogue Presented by the Restrictions of Covid	How do the restrictions of the pandemic impact cooperative learning?
	The Affordances of Digital Tools to Facilitate Dialogue	How can digital tools be used to enhance the cooperative learning process?
The Significance of Autonomy	The Necessity of Digital Tools for Scaffolding Learning	How can digital tools be used to enhance the cooperative learning process?
	The Restrictions of the Pandemic as an Impediment to Autonomy	How do the restrictions of the pandemic impact cooperative learning?
	A Sense of Autonomy as Key to Motivation	How does the nature of the task affect the cooperative learning process?