Digital competence as interactional accomplishment: An ethnography of early enactments of the DCF

by

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Abstract

Recent years have witnessed the reform of UK national education curriculums, with an emphasis on rethinking ICT and computing as teaching *subjects*. In Wales, the Digital Competence Framework (DCF), a cross-curricular framework, was the first element of the Curriculum for Wales 2022 made available to schools. Drawing from an ethnographic study of a primary school in Wales, I explore how this framework is enacted, what sort of troubles arise, and the methods for solving these *in situ*. Bringing together tropes and sentiments from science and technology studies (STS), digital sociology, and the sociology of education, I consider the classroom as a site ripe for examining setting-specific dynamics and practices of knowledge production. This primarily involves combining an ethnographic sensibility with an ethnomethodological orientation to the study of knowledge as an interactional accomplishment.

First, I show how pedagogical dialogues enable the introduction of technical vocabulary, and how pupils and teachers rely on occasioned interpretive procedures for this. Second, I explore the production of instructions for an ICT independent learning activity, in particular, the collaborative accomplishment of understanding instructions in-action. Third, I capture an instance in which insufficient instruction to access an online assignment unveils the delicacy of classroom order, and the practical and moral implications of producing an instructional repair. Taken together, these occasions offer an account of the interactional work involved in accomplishing classroom-specific-work, with special attention afforded to the situated detail of classroom activities as instances of DCF enactments. I show, then, how a new policy is translated into practice, and examine ways in which digital competence is locally and interactionally accomplished.

As Wales looks to pioneer digital education, this study provides an early portrait and analysis of just how this happens, and how it is made possible, within Welsh primary education. It contributes theoretical and methodological debates about the study of technology in use and digital education in practice, whilst prioritising practical details, it proves to be informative for teachers and policy makers alike.

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Dedication

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Bendición abuela.

Chapter 1: Introduction

In this thesis, I examine early enactments of the Digital Competence Framework (hereon the DCF) in a primary school in South Wales. The aim has been to produce insights into what is practically involved in the teaching of digital competency in early education in Wales. As such, the DCF is one of three cross-curricular statutory responsibilities (alongside Literacy and Numeracy) included in the New Curriculum for Wales (2022). The Literacy framework is designed to develop learners' translanguaging[1], listening, reading, and writing skills across the curriculum, and the Numeracy framework is designed to develop learners' mathematical proficiency, understanding of numerical systems, geometry, measurement, and statistical data and probability models. In contrast, the DCF is designed to develop learners' digital citizenship and skills for interacting and collaborating in digital environments, producing digital content, using data, and implementing problem-solving and computational thinking skills. The goal is that through developing these skills, learners will become informed, capable, and able to thrive in contemporary society.

The development and implementation of the DCF takes place at a time where the ubiquity of digital technologies in people's everyday life is no longer questionable. For the emerging Digital Sociology, 'the digital' is a social fact (Marres 2017). The pervasiveness of digital technologies (systems, infrastructures, hardware, and software) is undeniable, at least for a large portion of the population. Instead, what has become questionable for some, is the state of the educational system, and its capacity to reflect the needs of a way of life susceptible to and entangled with the emergence and proliferations of a variety of digital innovations – ongoingly created, outdated, and updated. Thus, a study of the DCF offers the opportunity to document how a policy designed to tackle this

[1] In the Welsh curriculum, *translanguaging* is 'a pedagogical practice that alternates the use of Welsh and English for input and output in the same lesson. The idea is to get information in one language and to work with that information in the other language' (Cenoz and Gorter 2017, p. 311).

issue is enacted in practice, and what the enactments of this policy tell us about our way of understanding *the digital* as a tool and an object of knowledge in early education.

In the following pages, I provide a brief account of the historical background that led to the development of the DCF, then I discuss the way I approach the study of the DCF in this thesis, and finally, I outline the content of the remaining chapters.

1. In/glorious history of ICT in the UK

The UK enjoys of a history of great scientific and technological innovation. As early as the 19th century, the UK was pioneering in computing, with foundational figures such as Charles Babbage and Ada Lovelace. In the mid-20th century, Alan Turing advanced the concepts of algorithm and computation with the Turing machine. It was also in the UK that the first electronic digital programmable computer (The Colossus) and the first electronic stored-program computer (The Manchester) were created. In 1951, the world's first commercially available digital computer was sold by a British company (the Ferranti Mark 1). However, although a British company beat its international competition in selling the first computer by four months, from the 1960s, the reputation of the UK as a hub of computational development rapidly diminished. During that decade, the British computing companies were weakened and ultimately replaced by a tide of American-made IBM computers (Hendry 1984). If, at some point around the 1970s, there was an opportunity to change this by shifting the investment from the hardware industry to the software business, the opportunity was missed. This is what the computer science community called *the British problem* (Hendry 1989). Namely, a mismanagement of investment by the National Research Development Corporation (NRDC), and a failure to translate high levels of technological expertise at the vanguard of global computing development into the hoped commercial success in the international market.

By the 1990s, the image of the UK as a place leading in computing innovation had vanished, and instead Silicon Valley emerged, consolidating the USA as the world leader of technological advancement alongside Asian countries such as China, Japan, and Taiwan. The argument is, as I explain below, that this decay impacted not only the British

technological industry, but computer science as a career prospect and, consequently, computer science as a school subject. Through the 1990s, computer sciences and programming gradually disappeared from school curriculums in the UK, and instead ICT was introduced as the relevant subject to educate on computer-related skills. Computational scientists complained that this new subject was too focused on a hardware and software user-based perspective and not enough on the teaching of 'genuine IT' (The Royal Academy of Engineering 2009, p. 17). That is, the underlying principles of computation that would allow students to become future computer programmers was being overlooked in the teaching arrangements.

By the 2000s, the ICT subject suffered from a problem of a diminishing and discredited reputation (The Royal Society 2012). Experts related this issue to a perception of ICT as a low-value discipline, especially when compared to other STEM subjects. The Royal Academy of Engineering (2009, p. 16) argued that this was due to schools being forced to use non-specialists for ICT teaching – 'only 15% of school IT teachers [had] a degree in the subject and nearly 70% [had] no post-A-level qualification in IT'. The situation was reported to be even bleaker in Wales, where the percentage of teachers with no post-A-level qualification in IT rose to 75% (Crick and Moller 2016). The issue, it is claimed, was the absence of a system to train teachers and keep them updated with a fast-changing subject, which meant that qualifications tended to be less demanding and, consequently, not well regarded. This, in turn, created a snowball effect; students doing their GCSE and A levels developed only very basic understandings about how to use a computer, leading to only a small number of students applying to computational science and ICT related university degrees (The Royal Society 2012).

Consequently, when it came to the workforce, the UK was producing a small number of professionals at a time when there was an increasing demand for this skillset worldwide. Thereby, an ICT skill gap in the labour market emerged, which in turn was exacerbated by technical skills being replaced with management skills, under the belief that core technology skills would not be necessary for UK domiciled positions (The Royal Academy of Engineering 2009). This problem was reported to be eroding further the low ICT skills situation in the UK, with unqualified individuals filling the lacuna. Ultimately,

firms found themselves unable to hire staff because of a gap in locally educated skills and the difficulties to bring overseas expertise[2].

The concerns and recommendations of the computational science community were manifested by the Royal Society and the Royal Academy of Engineering (2009, 2012). In short, these reports treated the disappearance of computing programmers as the consequence of the low standard of the ICT subject, and it was argued that these educational deficiencies were negatively affecting the economic landscape and its growth prospects. These reports suggested that better ICT educated professionals and more people pursuing ICT related careers would improve the UK's possibilities of positioning itself as a global leader once more. Consequently, the Royal Academy of Engineering (2012) called for a full review of computer literacy in schools and higher education to improve the IT capability and skills of the workforce for both the private and public sector. They suggested the Government to engage with industry and academia to create pertinent school curricula and undergraduate and postgraduate courses, and to help change the public perception of careers in technology.

By the 2010s, there were several initiatives pushing to bring back computer science into schools in the UK – e.g., the Technocamps in Wales to support computer science education (Crick and Moller 2015). Of course, this did not occur without resistance. Only after the publication of the aforementioned reports, combined with the pressure from the industry and a changing global economic and political landscape after the 2008 financial crisis, the varied initiatives proposed slowly start to be taken seriously. Thus, in terms of changes in school curricula, Computing Programmes (2014) of study were added to the National Curriculum in England, a National Framework for Digital Literacies (2020) in Scotland, and a Digital Skills Curriculum (2021) in Northern Ireland. And in Wales, a full curricular reform took pace, introducing first the DCF (2016), followed by the creation of the Science and Technology Area of Learning and Experience (AoLE) that includes computing and programming (2022).

[2] ICT skills were not included in the Home Office's Migration Advisory Committee shortages occupations list.

2. The creation of the Digital Competence Framework

In September 2012, Leighton Andrews, the then Minister for Education and Skills in Wales, summoned a seminar to debate the role of Wales 'in the global economy of the future' (Andrews 2012). Among those participating in the discussion were members of the National Digital Learning Council (NDLC), further and higher education, and private organisations. One outcome of the discussion was the recognition of a need to rebrand and reengineer a new ICT subject for schools, and to establish a Steering Group to take forward such recommendation. The Steering Group was formed by the head of operations of Box UK (a software development company), a scholar with a computer science background and an interest in policy, and a primary school headteacher with a computer science background. These members represented three different sectors of society: the tech industry, academia, and educational practitioners. The group published a report in September 2013 recommending the disaggregation of the old ICT subject into two areas: *computation science* and *information technology*. This division consisted of computation science being formulated as a subject in its own right (the fourth science in the STEM subjects), and information technology as a cross-curricular framework alongside literacy and numeracy. This framework was evoked as a shift from:

> '[A] focus on the technology, to a focus on pedagogy, skills development, transferability, and understanding, as well as potential application of these competencies' (Arthur *et al.* 2013, p. 16).

The Steering Group report (Arthur *et al.* 2013) was later used to inform Donaldson's independent review of Wales's curriculum. Donaldson's review materialised into the *Successful Futures* report published in January 2015, which became a cornerstone of the curricular reform in Wales. It is worth noting that the development of the DCF took place within a wide reform of the Welsh education system tailored, to an extent, to tackle the idea of a crisis in Welsh education echoed after the 'poor' performances of Wales in the Programme for International Students Assessment (PISA) from 2006 to 2015 (Rees and Taylor 2014), and to place educational professionals at the centre of the reform and the development of the curricula content.

In contrast to the 1988 educational reform – seen as imposed externally and as taking away educational practitioners' autonomy over curricula in all state schools in England and Wales (Hughes 1997) – the New Curriculum for Wales 2022 takes a radically different approach. Even though, at the beginning of the process, policymakers, academics, and the industry lead the conversations, leading schools later became the promoters and engineers of the curriculum. In this sense, the curriculum has been developed by teachers and schools across Wales, as it has been these practitioners who have been responsible for 'fleshing out the details' of the reform (Power *et al.* 2020, p. 319).

In October 2015, the Welsh government published *A curriculum for Wales – a curriculum for life*, setting out the terms and steps that would take forward the recommendations within Donaldson's report. One of these steps was the creation of the DCF, which became the focus of curricular development for the first years of the reform. The then Minister of Education and Skills, Huw Lewis, declared that an 'approach to teaching digital competence [was] too vital for our young people and our economy to delay in any way' (Lewis 2015, p. n/a). Following this announcement, the Minister tasked policymakers to work with schools, regional consortia, and experts from higher education and the industry to draft the framework.

As anticipated, the launch of the DCF became official in September 2016, establishing *digital competence* as 'the set of skills, knowledge and attitudes that enable the confident, creative, and critical use of technologies and systems' (Welsh Government 2016, 2018). The DCF was, therefore, not designed to cover computing, nor IT as a subject, but to develop skills to be applied beyond these subjects and across a wider range of activities and scenarios. The emphasis was explicitly formulated in terms of four strands: (i) digital citizenship, (ii) interacting and collaborating, (iii) producing, and (iv) data and computational thinking[3]. In addition, the Welsh Government put in place the Hwb, a digital bilingual platform created to support all teachers and learners with the implementation of the New Curriculum for Wales. The platform gathers various

[3] Details of these can be found in Appendix 1.

programmes and applications to enable digital education, including software suites such as Google for Education and Microsoft 365.

Defining what the digital competence actually consists of is, however, a tricky task, and this has caused the framework to suffer various modifications. During my fieldwork, I had the chance to talk to some of the key practitioners, such as Mrs Jones, involved in the shaping of the DCF and the curriculum. Mrs Jones commented that although some definitions were written down early on the process, people had found it difficult to agree upon a more concrete definition of what the term *digital competence* should mean in practice. For this reason, those originally involved in the processes of drafting the DCF designed a series of *classroom task ideas*, which in essence were examples of activities to conduct in the classroom. However, since the goal of this new curriculum is to provide direction and guidance so that each school can design their own curriculum to their needs, those later involved in the process decided to remove the examples. They maintained these kinds of example would limit the teachers, rather than helping them.

Moreover, the current guidance does not offer a description of digital competence, such as that figuring in 2016 and 2018. Instead, it is left undefined intentionally. The literature on digital literacy supports this kind of approach. For example, Lankshear and Knobel (2015, p. 8) argue that limiting definitions to lists of technical skill ignores that these skills can 'take on very different forms when embedded in different social practices involving different purposes and where different kinds of meaning are at stake'. Indeed, they suggest that 'we should think of digital literacies not as something unitary, and certainly not as some finite competency or skill' (Lankshear and Knobel 2015, p. 8).

Furthermore, policies, as any written documents in general, have intrinsic limitations regarding telling people *what to do*. Ball (1994, p. 19) determines 'they create circumstances in which the range of options available in deciding what to do are narrowed or change, or particular goals or outcomes are set'. Hence, translating policies into practice is a creative, diverse, and contested process subject to much interpretation (Ball *et al.* 2011). There is a preference, thus, for the notion of *enactment* over *implementation* (Braun *et al.* 2011), which reflects what I observed during my fieldwork (more on this later). In fact, when I was seeking directions regarding which schools to contact, the

Director of the educational regional consortium warned me to not look for schools "implementing the DCF" because that could put schools off. The DCF, although mandatory, is available online through a non-statutory guidance. Schools ought to produce their own take on the framework, adapting it to their own needs and contexts. Hence, I decided to perceive and study the enactments of the DCF as a matter of situated practice.

3. The study's aims

The starting point of the study is that whatever shape digital competence may have *in practice*, it can only be studied in relation to actual cases of enactments, rather than through theoretical and de-contextualised discussions. Therefore, an ethnographic approach was chosen as an appropriate way to study such phenomena. This thesis documents and analyses occasions in which digital competence is made visible, rational, and reportable for the purpose of classroom activities.

Further, I reformulate Winch's (1958, p. 11) central question for the sociology of knowledge – 'how is reality intelligible to man [sic]?' – and ask: how is *the digital* made intelligible to members of a classroom as a matter of competence? This is to emphasise the point that whatever we may refer to as *the digital* at any given point, will always be, first and foremost, a discursive phenomenon. Second, when seen from the perspective of competence and performance, it involves aspects of technique and embodied practice, and therefore an engagement with the material world. Finally, in the task of making intelligible this phenomenon, considering the context in which is delivered matters. As Orton-Johnson *et al.* (2015, p. n/a) put it: 'Digital, here, is not a neutral or free-floating technological abstraction; neither is it a panacea to technical problems. It is relational, social, and embedded'. Subsequently, this doctoral project is interested in exploring the practical, local, and situated elements of the process of knowledge production and technology use, in what has been conceived as an ethnographically *familiar* site: a primary school classroom.

The value of the insights offered here is that policymakers and schools themselves cannot precisely anticipate what these works of policy enactments will consist of in practice. The aim of this thesis is to provide such insights through the empirical study of three instances of classroom interaction in which digital competence is made 'visibly-rational-and-reportable-for-all-practical-purposes' (Garfinkel 1967, p. vii). These are (i) the introduction of technical vocabulary through a pedagogical dialogue, (ii) the instructions on an ICT independent learning activity, and (iii) the repair of insufficient instructions on an ICT independent learning activity. The analysis of these instances relies on a tradition of ethnographic research in sites of knowledge production and reproduction, and an ethnomethodological sensitivity that informs the analysis of ethnographic fieldnotes and video/audio recordings of classroom lessons and teacher workshops. However, this doctoral project is neither an ethnomethodological one, nor a conversation analysis. Not at least in a purist sense, but it borrows from these traditions an epistemological standpoint and a sensitivity to the reflexive nature of social phenomena, as well as a sheer number of concepts that articulate the analysis.

4. Thesis outline

The chapters to follow contain the details, procedures, aims, questions raised, findings, and the contributions of an ethnography looking at the everyday enactments of the DCF in a primary school in South Wales.

In Chapter 2, I review the academic literature that has informed this doctoral thesis. Placing the thesis within a single body of literature was not an easy task, mainly because a classroom is an unusual setting for an STS project. As such, the review of these literatures, not only aims at informing my analytical gaze, foreshadowing ideas that I further discuss through the analysis of empirical data, and formulating research questions, but I also take on the task of exploring the way STS literature can benefit a study looking at digital competence in educational settings. Although the literatures reviewed in this chapter cover an eclectic range of topics (from curricular content to software in use, from language as the vehicle for knowledge to embodied experiential knowledge, from classroom dynamics to laboratory work), underlying these discussions, I claim, there are common

sensitivities. In this sense, the selection of the works reviewed mainly belong to ethnographic, constructionist, interactionist, phenomenological, and ethnomethodological traditions (and the intersections thereof). This chapter discusses various theoretical approaches, analytical interests, and topics of research that inform the formulation of this study's research questions, which are formulated at the end of the chapter.

In Chapter 3, I discuss methodological considerations regarding the field site, fieldwork, and analytical approach. In short, I outline what was done and how it was done, both in terms of securing empirical data to ground my analysis and relying on an analytical approach embedded in a disciplinary heritage. The chapter describes the ways in which this thesis is born out of an ethnographic project with an ethnomethodological orientation to the study of social phenomena. Meaning, that it looks at the situated understanding of digital competence as classroom-specific-work and as an object produced from *within* local orders that structure classroom interaction. In this sense, the focus is on the *lived details* that make digital competence an *on the spot* phenomenon, produced out of the materials at hand (Garfinkel 2002). The chapter explains how the study is not set out to provide a full account of the implementation of the DCF, nor to assess whether the students are learning digital competence by meeting the assessment criteria. Instead, it aims to open the *blackbox* (Latour 1987) provided by the DCF and its undefined characterisation, through the detailed analysis of what is interactionally involved in instances of enactments. The main focus is on the ways that teachers produce instruction, recruit pupils' participation, and engage with a variety of technologies to make digital competence teachable.

Chapter 4 is the first empirical chapter. Here, I study the ways in which interactional and commonsense knowledge is *utilised* to accomplish the introduction of technical vocabulary. The discussion is based on the analysis of an introductory lesson on the notion of a database. The chapter describes the way that the teacher implements a series of pedagogical strategies to accomplish this task. For the most part, the teacher asks questions to the pupils, making pupils active participants in the shaping and unfolding of the lesson. Through this *pedagogical dialogue*, the class produces – in a very local and

temporal sense – an understanding of the term 'database'. Foregrounding the analysis are three empirical questions: (i) *What kind of resources do teachers and pupils draw on to accomplish educational outcomes such as the introduction of a technical term collaboratively?* (ii) *In which ways are these resources being utilised?* And (iii) *what contingencies do participants orient to?*

In Chapter 5, I look at instructions and analyse how they are organised and mobilised as pedagogical communicative expressions to set out tasks. The chapter demonstrates how a local understanding of digital competency is reconstructable through the instructions provided for that task, with *that* class, at *that* point in time. I examine the level of instructional detail that is made practically necessary to instruct about each step of the activity, with the recourses at hand. Specifically, I detail the procedures by which tacit embodied knowledge is made available and reconstructable for the pupils, and the uses of digital technology in accomplishing these reconstructions. Guiding this analysis are the following empirical questions: (i) *How are instructions crafted so that they enact the DCF purposes?* (ii) *How do instructions exhibit objectivated predicates of digital competency?* And (iii) *how would instructions on ICT independent learning activities have to be produced to prove practically adequate?* I further look into answering questions such as (iv) *what is the teacher doing with the software as she instructs on its use?* (v) *How does the software and its features shape the instructions?* And, in turn, (vi) *how do instructions reflect a particular vision of the software and its features?*

In the final empirical chapter, Chapter 6, I analyse a classroom encounter in which the teacher's apparent lack of sufficient technical knowledge poses a problem for classroom work. More concretely, I examine how the teacher's incomplete instruction is made a work object for the class and the interactional effort that gets done to repair it. The analytical questions guiding this chapter are: (i) *How the teacher and the pupil manage troubles arising from the teacher's digital competence?* And (ii) *What does this scene tell us about the challenges teachers may face when integrating new practices and technologies?* I use this occasion to discuss further the topic of teachers' digital competence as a main factor identified in the literature for the successful implementation of a digital curriculum.

In Chapter 7, the last chapter, I wrap up the thesis by formulating answers to the research questions raised in Chapter 2, whilst identifying the thesis's main contributions and areas for future research.

Chapter 2: A bricolage of disciplinary heritage

This chapter reviews the academic literature that has informed this doctoral project. The intention underpinning it is the presentation of a patchwork of diverse and sometimes overlapping ideas that, nonetheless, work to build an analytical foundation for the study of classroom interaction and digital technology, which informs the methodological approach of this research project. The presentation of this eclectic literature review is also the result of a challenging start with this research project. Given I did not have a background in Science Technology Studies (hereafter STS), nor in Educational Studies, and due to the inductive nature of my approach to social research more generally, I did not have a clear starting point from which to develop this project.

Moreover, placing the thesis within a single body of literature was not an easy task, mainly because a classroom is an unusual setting for an STS project, even though the focus of this thesis – the teaching of digital competence – remains close to themes in STS and, mainly, the sociology of (scientific and technical) knowledge. What was clearer for me, however, was that I was interested in studying the enactment of the DCF in *practice*, and the way people produce situated notions of *the digital,* and what it means to be digitally competent, when, by whom, and how. In this sense, the project was developed under the presupposition that teaching and learning digital skills are everyday interactional achievements. There is a focus on situated practice, local accomplishments, and the ordered details of knowledge production practices in classroom settings, which eschews this literature review towards the ethnographic, constructionist, interactionist, phenomenological, and ethnomethodological studies of knowledge in context.

The chapter is divided into four main sections and a conclusion. The first section centres on the topic of knowledge in education. It explores the contribution of the (now old) *new* sociology of education regarding knowledge and the curriculum and ethnographies of education's insights into how people learn. In the second section, I further discuss the contribution of ethnographers and ethnomethodologists regarding the dynamics of classroom interaction, especially teacher and pupil strategies during pedagogical

encounters and task instructions as the medium by which teaching and learning is largely accomplished. In the third section, I discuss studies of digital technology in the classroom and the way STS approaches for the study of the situated use of digital technology can contribute to educational research. In the fourth section, I discuss contributions from the sociology of scientific (and technological) knowledge to consider further how to bring STS ideas into an educational research project. Finally, a fifth concluding section summarises the chapter and raises the research questions to be addressed through the findings chapters.

1. Knowledge and education

Questions about *knowledge* and its relationship with social actions, processes, and *facts* have been at the very heart of the sociological endeavour since its foundations in the 19th century. We have, for example, Marx's theories on ideology and *false consciousness*, Durkheim's ideas about the symbolic content of religious rituals and magical beliefs, and Weber's considerations of individuals' subjective meanings. Much has been said about knowledge since, but due to the contingencies of a thesis format, limited by a word-count, I will focus only on reviewing those whose principles closely align with my own research interests. In other words, this section reviews the literature that has treated *knowledge* as an object of sociological investigation in this own right in the field of education; mainly, concerning the developments produced after the sociological turn in educational research in the 1970s. Approaches and insights about the production of knowledge from an STS perspective will be also discussed in the fourth section of this chapter.

More concretely, in the following pages, I want to consider the way sociologists of education have studied the topic of knowledge and knowledge transmission, what different approaches they have offered to the study of learning and schooling, but also the situated nature of knowledge production. For this purpose, I examine some of the contributions of the (now old) *new* sociology of education, ethnographic studies of education, and ethnomethodological studies of educational order. In doing so, I also consider classic contributions of the sociology of knowledge that might be useful to bear

in mind when thinking about the production of technical and technological knowledge in the classroom.

The topics of this investigation, such as the constitution of knowledge and how we learn to know what we know, yields issues of language and meaning. However, the full range of perspectives in language is not reviewed in this chapter. An overview of the main approaches to the study of language in educational research can be found in Green and Stewart (2012) and *The Handbook of Classroom Discourse and Interaction* (2015) edited by Numa Markee. Here, I offer a short narrative about my influences in conceptualising the development of communicative and interactional competence through the lens of language in-context. In particular, I consider interactionist, phenomenological, ethnomethodological, and conversation analysis contributions. I intentionally do not draw rigid lines to separate these approaches. This decision is the result of a long consideration over what kind of sociologist I would like to be, or, in this case, not be (i.e., I avoid taking any school of thought dogmatically). Instead, I bring them together to form an eclectic patchwork of analytical inspirations – one which, I believed, becomes well-suited to approach the concerns found *in the field*, through the course of collecting materials, rather than merely formed from a personal, disciplinary preference.

Structure and knowledge in the school system

The *new* sociology of education was developed in Britain during the early 1970s when Young (1971) and Bernstein (1971) provided a critique of much of the work that preceded them[4]. For example, Young (1971) argued that research in education had overlooked the content of education, methods of teaching and the way in which knowledge is organised in the school curriculum. He also argued that the sociology of education had never explored the meanings, assumptions, and interpretations of

[4] In the origins of the discipline, according to Lagemann (1988, in Macbeth 1996), there were two opposed approaches competing to dominate the emerging discipline. One was led by Dewey and other by Thorndyke. The second won, and the result was a long-standing psychological and quasi-experimental approach to study learning. Put simply, psychologists started theorising about the mental processes that occurred in between stimuli and response, first with a focus on behaviour and then on cognition.

educational issues, such as 'the less able', 'school achievement', 'curriculum objectives' and 'the content of the curriculum' (Burgess 1986, p. 14).

Young's (1971) collection of papers, entitled *Knowledge and Control*, offered a radical alternative to the study of education that linked to theories of knowledge, control, value, and action. Central to his approach was a focus on knowledge, curricula, and assessment from the educator's point of view. Consequently, some studies centred on the curriculum content and the way in which that content was determined, evaluated, and made available. For example, Eggleston (1977) explored questions such as who decides what is to be taught, why there is a status hierarchy of curriculum knowledge, and why some pupils are effectively excluded from some areas of knowledge and admitted to others. Other examples can be found in Young's (1976) study of how science curricula were constructed, Keddie's (1973) study of working-class students, Vulliamy's (1976) study of what counted as school music, and Mathieson's (1973) research on the debates over English language and literature. The formulation of *knowledge* in the context of these works considered it as something that defines cultures and subcultures, something that can be transmitted and distributed, legitimised, and delegitimised, the content and method for socialisation, and an instrument for social control.

For Young (1971), the focus was to be found in the way in which teachers' perspectives are socially constructed, on the meanings teachers attribute to social situations and the way in which educational activities are defined. The central task, as described by Burgess (1986, p. 15), was to 'examine education from the participant's point of view by focusing on their perceptions, interactions, and assumptions', and the main analytical concern was with *classroom knowledge*. These educational sociologists, through a constructionist[5] approach, saw the structural parameters of education, such as school outcomes, language

[5] *Social constructionism* is sometimes also referred to as social *constructivism*. However, as Hacking (1999) points out, the version of social construction that Berger and Luckmann (1966) discussed had no direct connection to earlier constructivist movements in art and mathematics, or with systematic methods of theory or proof construction. Some authors (including me) prefer the term *constructionism* over *constructivism*, as to not confuse it with these constructivist movements or constructivist approaches associated with pedagogical strategies (e.g., Vygotsky's social constructivism and Piaget's cognitive constructivism).

performance, exclusion, and so on, as objective aspects of reality. Yet they also considered this *objectivity* as being 'produced out of, or arises from, myriad of social actions in the Weberian and Schützian meaning of the term' (Maeder 2018, p. 138).

Bernstein's (1971) paper, on the other hand, put forward two analytical notions for the analysis of educational systems. He called these *classification* and *frame*. He conceived the notion of *classification* in relation to 'the degree of boundary maintenance between [subject] contents' (Bernstein 1973, p. 88). Therefore, classification is a matter of 'definition, maintenance and validation of domains of knowledge' (Atkinson 1985, p. 133) in relation to the organisation of knowledge into curricula. Thus, curricula can be categorised as having strong or weak classification, as referring to strong or weak boundaries between its subjects. *Frame*, on the other hand, refers to 'the degree of control teacher and pupil possess over selection, organisation, pacing and timing of the knowledge transmitted and received in the pedagogical relationship' (Bernstein 1973, p. 88). In other words, it constitutes a more situated approach to what is actually taught in the classroom and how it is taught. Whilst classification 'characterises curriculum', framing 'refers to the context of knowledge transmission – that is, the pedagogic encounter' (Atkinson 1985, p. 135). Thus, whereas curricula convey the convention of *valid knowledge*, pedagogy refers to *valid strategies* of knowledge transmission. As with classification, Bernstein thought of frame in terms a weak and a strong axis; 'strong framing is exemplified by programmed learning, weak framing by a 'free' class in which pupils choose what they will 'learn' and how to 'learn' it' (Delamont 1983, p. 43). From these ideas, Bernstein (1975) proposed two ideal types of pedagogy: a *visible* pedagogy characterised by a strong frame and a strong classification, and an *invisible* pedagogy characterised by a weak frame and weak classification.

According to Delamont (2014), Bernstein was aware that in educational institutions which claimed to follow an invisible pedagogy, the *real power* remained in the teacher's hands; 'only an idiot was 'fooled' by the appearance of unstructured personal negotiations' (Delamont 2014, p. 172). In a different paper, Delamont (1983) also argues that Bernstein's notion of framing was not subtle enough because not all knowledge can be overtly coded: 'Every syllabus and curriculum have, in addition to its public, official

specifications (the manifest curriculum) its unspecified, taken-for-granted 'rules', which also have to be mastered – the hidden curriculum' (Delamont 1983, p. 44). Considering the *hidden* and the *manifest* curriculum allows to think of situations in which, for example, the manifest curriculum shows weak classification, while the hidden curriculum exhibits strong framing. In addition, Delamont (1983, p. 45) suggests that the concept of classification should be considered as 'potentially varying in strength at different organisational levels of the education system and between the hidden and the manifest curricula'.

For example, in considering the classification of the New Curriculum for Wales (2022), we might want to consider the way in which subjects such as mathematics, physics, history, and language had been replaced by the six Areas of Learning and Experience (AoLE). These are broad domains of knowledge that are left more or less open for each school to *fill in*. They are seen as frameworks or guidance to help schools design their own curriculum in a way that encourages an integrated and cross-disciplinary approach. Moreover, the Welsh Government, through The Learning Partnership (TLP), encourages schools to adopt an Inquiry Base Learning (IBL) approach to design classroom activities. This is a constructivist[6] approach 'to learning whereby students find and use a variety of sources of information and ideas to increase their understanding of a problem, topic, or issue' (Kuhlthau *et al.* 2007, p. 1). In the context of the school where I conducted fieldwork, this meant that the class (the teacher and their pupils) would decide a topic of enquiry at the beginning of the term and they would do so *together*. The enquiry would be answered by producing a variety of textual (and sometimes also audio and visual) materials (such as written documents, databases, collages, etc.) that would draw upon different areas of learning and experiences, as well as the cross-curricular frameworks (including the DCF). The main objective of most classroom tasks and

[6] As a pedagogical strategy, constructivist teaching shifts from a *telling-listening* approach to a collaborative approach in which students' contributions to the class are the focal point. Moreover, there is an emphasis on contextualised knowledge (as opposed to abstracted), with *meaningful* instruction and tasks that reflect problems in the real word (Schreiber and Valle 2013). As stated earlier, this notion of constructivism is different than the version of social construction that Berger and Luckmann (1966) discussed below.

activities was the production of such enquiry-related materials. A school following this approach can, in theory, be categorised as following a weak classification of the manifest curriculum, but as this thesis demonstrates through the findings chapters, the hidden curriculum can – at the same time – show a strong framing, in a Bernsteinian sense.

In different ways, Young and Bernstein drew upon the traditions of the sociology of knowledge in directing attention to the social production and organisation of the contents of schooling. However, their theories correspond better with a structuralist take on the issues of the construction of knowledge. For them, knowledge is characterised as a structured and coded *collective representation*, and the central matter to consider is the system of classification and order (Atkinson 1985). This approach differentiates from an interpretivist take on the construction of knowledge, which characterised much of the educational ethnographic research that emerged – contemporarily to the *new* sociology of education – from the 1970s onwards in the UK. For interpretivists, knowledge and meaning are 'the emergent outcome of transactions between actors or groups of actors' (Atkinson 1985, p. 145). Consequently, the work these actors accomplish in the construction and maintenance of meaning constitutes the focus of analysis.

Delamont (2014, p. 168) argues that the timing of Young and Bernstein's contributions 'was not coincidental or accidental'. After the introduction of the Circular 10/65 in 1965 by the Labour government, the 11+ exam and the tripartite system for secondary schooling were abolished. Instead, comprehensive secondary schools were introduced across England and Wales: 'As the majority of 11-year-olds began to enter comprehensive secondary schools, the big issues became not 'what type of school does X type of pupil get in to?' but 'what is the internal organisation of the school X type of pupils attend, and what is he (or very rarely she) taught there?' (Delamont 2014, p. 168). This policy change affected the structure of educational paths and directed the focus towards the *internal* organisation of the school; what was taught, who was able to become a student, and how different curricular became the decisive factor in the students' *life chances*.

Thus, the new sociology of education marked an intellectual and political change in regard to the principles underpinning educational research in the UK. However, since its outset, there were significant tensions and incoherencies, mostly deriving from the fact

that its proposers borrowed ideas from different and sometimes conflicting traditions. For example, the existentialist Marxism and the phenomenological approach to the sociology of knowledge by Berger and Luckmann (1966) shaped their notion of *construction*. Subsequently, different authors followed and developed different paths, and the new sociology of education slowly became a less coherent group of scholars. The part that lasted and still has some influence is Bernstein's sociological approach to the study of curriculum and assessment which has provided a conceptual framework for analysing knowledge and power for many. For example, of interest to this thesis is the work of Jungck (1987, 1990) on the *nature* and *distribution* of computer literacy (focusing on the framing of computer literacy knowledge), whereby she concluded that both nature and distribution were not equal among different groups of students. She asserted that 'technological empowerment requires more than technological skills' (Jungck 1990, p. 289), and there is a need to attend to socio-economic and cultural background, access to technology, and other relevant social, cultural, and political factors.

However useful these approaches are for understanding aspects of the education system, they neglect an examination of what constitutes educational encounters. For this purpose, in the following section, I turn the discussion to interactionist and ethnomethodological approaches to the situated production of knowledge in education.

Socialisation and knowledge transmission

Parallel to Young and Bernstein's new sociology of education, there were a series of projects influenced by social anthropology, attempting to document educational institutions and the process of socialisation within them. At the University of Manchester there were projects led by Lacey, Hargreaves, and Lambart[7], and at the University of Edinburgh, a centre run by Hudson and Parlett. Unlike Young's and Bernstein's studies, which relied on documentary analysis, these groups were committed to the use of the naturalistic observational method for the study of education and institutions. Much of the

[7] Lacey (1970) studied social relations in a boys' grammar school, Lambart (1997) studied them in a girls' grammar school and a secondary modern school, and Hargreaves (1967) produced the famous study of pupils subcultures in a boys' secondary modern school.

work that emerged from these projects was undertaken by anthropology graduates – e.g., Delamont's (1973) study of an elite girls' school and Atkinson's (1981) study of the Edinburgh medical school – that 'passed through a phase of social-psychological methodology, and came to rest in an interpretive sociology, informed by interactionist and phenomenologically inspired traditions' (Atkinson and Housley 2003, p. 92).

Previous to these group of projects, schools were – more often than not – treated as a *blackbox* between educational inputs and outputs. However, the lack of empirical data about what was happening behind the classroom's doors, in combination with the emergence of a strong anti-positivist qualitative turn and interpretative approaches, led to the establishment of educational ethnographies as a legitimate field of study (Atkinson and Delamont 1980)[8]. Wolcott (1982, p. 7) argues that the intent was 'to help educators look at themselves... to turn their attention to what actually goes on in schools rather than to be so singularly preoccupied with what ought to go in them', which led to discover – as Delamont (2016, p. 9) argues – that '[w]hat policy makers, politicians, head teachers or governing bodies think is happening in classrooms simply is not what actually goes on'.

One of the changes this analytical shift brought about was a different relationship with the nature and role of theory. Previously in much educational research, there was 'a tendency to treat theory as providing hypotheses to be tested, or at least as laying down the framework for any empirical investigation' (Hammersley 2018, p. 178). Instead, the emphasis on *thick description* (Geertz 1975) and/or on *grounded theorising* (Glaser and Strauss 1967) surfaced as guiding principles to relegate theory to a middle-level explanatory account (Hammersley 1983). Of course, this regard for theory was not shared among all. Some scholars orbited towards a Marxist approach to the study of education, e.g., Willis's book *Learning to Labour* (1977). Later, feminism also emerged as a relevant analytical approach. Feminist researchers such as McRobbie (1978) and Griffin (1985) in the UK and Lather (1991) in the USA began to use ethnographic methods to analyse the

[8] An overview of ethnography and education in the early years is offered by Smith (1978), Hammersley (1980), and Wilcox (1982), among others. Additionally, Delamont and Hamilton (1986) discuss in more detail the difference between ethnography and systematic classroom observation addressing the tensions between a positivistic tradition and an emerging interactionist approach.

construction of gender in schools and its consequences for educational achievement and the reproduction or change of societal gender relations.

However, with an integration of interpretative approaches, interactionist studies started populating the literature. This brought into the conversation a different take on the study of socialisation. Some of the main intellectual contributions included Mead's notions of *mind*, *self*, and *society*, which conceived selves and identifies not as self-contained entities, but as processes. Consequently, socialisation and enculturation were starting to be seen as processes that have no determined starting or ending point (Atkinson and Housley 2003). Moreover, language became central, conceptualised as the vehicle that allows the production and realisation of 'interpretative schemes, cognitive and moral norms, value systems and theoretically informed 'world views'' (Atkinson and Housley 2003, p. 94). Another key influence was Goffman's (1961) work on total institutions and identities, moral career, and the theory of types, which heavily influenced a significant portion of ethnographers looking at classroom interaction (e.g., Woods 1979).

The developments in studying language-in-use in educational contexts were driven by two independent conceptual arguments. On the one hand, the *social construction of reality* (Berger and Luckmann 1966), which is properly addressed in the last section of this literature review. On the other hand, the notion of everyday life as produced in and through everyday language use[9]. These developments opened the door to a wide array of approaches to the study of language in education; from sociolinguistic and anthropological linguistics, (critical) discourse analysis, ethnomethodology, conversation analysis, and ethnography of communication, among others. In this literature review, as stated in the introduction to this chapter, I focus on interactionism, ethnomethodology, and the phenomenological heritage of both.

[9] An early influence can be found in Malinowski (1922, 1967). Other relevant influences also include Wittgenstein (1989 [1967]), Schütz (1973), and Gumperz and Hymes's (1964) issue of the *American Anthropologist*, among others.

Language and knowledge

Schütz (1973, p. 7) argues that all possibility of grasping any aspect of reality lies in our ability to rely on stocks of previous experience, 'our own and those handed down to us by parents or teachers'. The argument is that these shared stocks of knowledge provide us with *schemes of reference* we deploy to make sense of the everyday world, i.e., they enable the recognisability of acceptable ways of talking and behaving meaningfully for members' sense making. Schütz's notion of *member* (and for that matter *membership*) has a special connotation, which ethnomethodologists borrow. *Member* is not used to refer to persons or individuals as such. Instead, it refers to capacities or competencies that people have as members of society; capacities to speak, to know, to understand, to act in ways that are sensible in that society and in the situations in which they find themselves.

A central aspect of Schütz's argument is that in everyday settings, people navigate interactions by assuming that stocks of knowledge are shared, objective, and anonymous. He called this the *reciprocity perspective* (Schütz 1973, p. 11). Cicourel (1971, p. 147) puts it this way: 'members assume, and assume others assume it of them, that their descriptive accounts or utterances will be intelligible and recognisable' because they are relying upon *what everyone knows*. Schütz (1973, p. 5) also argues that all our knowledge of the world involves *constructs*, that is, 'a set of abstractions, generalisations, formalisations, idealisations specific to respective level of thought organisation'. In creating those constructs, 'the vocabulary and the syntax of everyday language' (Schütz 1973, p. 14) play an essential role. The argument is that constructs are created primarily through a language of named things and events. However, as Schütz (1973, p. 350) notes when discussing William James' notion of *fringe* meaning, 'language does not merely consist in the content of an ideally complete dictionary and an ideally complete and arranged grammar'.

Wieder (1971, p. 108) warns that anyone dealing with 'language is faced with the choice of assuming the stability of everyday language use or directing [their] attention to the indexical properties of everyday language use'. Ethnomethodologists opt for the second one. In fact, the notion of *indexicality* is a central to this school of thought.

Ethnomethodologists argue that because everyday language use is characterised by the use of indexical expressions – which are inevitably subject to indefinite elaboration (Garfinkel 1967) – any attempt to conceptualise its use in terms of rule-like grammar and semantics will always be flawed for empirical analysis. Wieder sustains that this is because:

> '[I]n everyday talk persons constantly use expressions the sense of which is relative to the place in which it is spoken, what the hearer knows about the speaker, the time at which it is spoken, and an indefinitely extendable collection of other contextual matters' (Wieder 1971, p. 108).

In other words, the ethnomethodological idea of indexicality conveys the actionable basis of meaning tied to local and temporal parameters, as there is hardly anything we can say, where meaning is not fastened to the occasion in which it is produced. In these terms, meaning is neither private nor subjective but methodically achieved and publicly available for both the lay and the professional analyst (Macbeth 2010). Moreover, Garfinkel (1964) suggests that participants in a conversation do a great deal of work of *glossing* and filling in the gaps, which allows things to *pass* despite their ambiguity or vagueness. He called this phenomenon the *et cetera assumption*, and it is key to emphasise that we do not always (and possibly hardly ever) know exactly what the other knows. Still, we can infer meaning, produce meaningful actions, and, in short, communicate with each other; we have *ethno-methods* for it.

In line with this idea and drawing from the work of Schütz, Cicourel (1971) argued that key in the process of situated sensemaking is the development and competent use of *interpretive procedures*. For him, these are 'a collection of instructions to members by members [...] whereby members assign meaning to their environment' (Cicourel 1971, p. 149). They are reflexive and operate within or in reference to the social settings in which they are being used:

> 'Physical features of the ecological scene, the members' presence or absence, the existence of conversation or its absence, and features of talk within conversation all provide the participants with continuous "instructions" for orienting themselves to their environment and deciding appropriate inferences and actions' (Cicourel 1971, p. 150).

The notion of interpretive procedures overlaps with what Garfinkel (1967b) calls *the properties of practical reasoning*. They encompass that which is essential in creating a sense of local *social structure*, which inevitably conditions members' actions by making local norms and rules recognisable and relevant in each and every situation. The competent use of interpretive procedures, as well as the adequate imputation of this competency by members to other members, is an essential aspect of *successful* social action (Garfinkel 1967; Cicourel 1971; Mackay 1974). This assumption, however, does not imply that internalised attitudes and norms provide automatic guides for social actions. Rather, the appropriateness of rules and norms are developmentally and situationally constrained, which in the context of studying classroom interactions bring us to consider *setting* seriously. As Rogoff (1990) reminds us, classrooms are special kinds of settings with local cultures of interaction and certain priorities about what kinds of knowledge and competences are needed for successful social action.

McHoul and Watson (1984) identify that a pervasive feature of educational settings was that learning often occurs when one kind of knowledge is transformed into another one (e.g., from *ordinary* information to *subject* information), and note that this transformation required a third kind of knowledge. Drawing from Cicourel (1971), they call this *procedural knowledge*. This is knowledge of *how*; 'knowledge of ways and means or methods' (McHoul and Watson 1984, p. 281). The pedagogical sequences produced between adults and children in primary school settings offer *perspicuous settings* (Garfinkel 2002) to observe the progressive and developmental acquisition of procedural knowledge. Although children are commonly seen as *tabula rasa* (Mackay 1974), studies on the process of socialisation have shown that adults systematically rely on children's interpretive competencies to communicate, even in situations where children are expected to not to know. This suggests that knowledge is never produced *out of the blue*.

In the context of this research, this assumption opens up a series of analytical questions that can be grounded in empirical observation. For example, what sorts of stocks of knowledge are mobilised to make pupils digitally competent? Or more concretely, what sorts of knowledge, materials, and resources do teachers rely upon to accomplish the educational outcomes stipulated in the DCF? Are these different when the educational

outcome is subject information rather than for example, technique and skills? And, as Delamont (2014, p. 176) suggests asking, 'what is explicit and technical, versus what is implicit and tacit? The official curriculum in formal education settings, such as schools, and the written texts that embody it needs to be recorded; but the hidden curriculum needs to be explored too'.

Body and knowledge

In considering what may be tacit and implicit, I dedicate this section to briefly comment on some of key contributions made by ethnographic studies that have looked into the implicit curriculum of technique and instrumentation (Delamont and Atkinson 2018, pp. 71-89). These are ethnographies that examine the embodied process of learning arts and crafts, which often implicate an array of practices involving materials, tools, and techniques. They often study educational processes outside formal mandatory education. One example is Shone and Atkinson's (1981) study of an industrial training unit for unqualified school leavers in South Wales. Unlike educational settings such as schools, curriculum and pedagogy in this vocational educational setting did not reside in a series of written aims and objectives, 'but was embodied in the workshop's machinery, the work routine that the machinery implied, and in the material objects that the young people made (and the workshop supplied under contract to the enterprises)' (Delamont and Atkinson 2018, p. 76). Put simply, pedagogical strategies placed body, tools, materials, and technique at the centre of the instructive practices (e.g., Sudnow 1978; Wacquant 2004). Techniques of the body are seen as learned body actions that embed aspects of a knowledge domain – or even a culture (Mauss 1973, 2006). Based on Delamont's studies of Capoeira and Atkinson's multiple studies of crafts (glassblowing and ceramics) and Tango dance, Delamont and Atkinson (2018) argue that the body is *enculturated* as much as the mind. In alignment with a phenomenological heritage, they see tools becoming an extension of the artisan's body through repeated use and supervised practice:

> 'The apprentice learns the relevant posture of the successful worker he or she finds the right angles at which to hold the tools, the right way to position the

> hands and the arms; learns to relax the body, learns which way to apply pressure' (Delamont and Atkinson 2018, p. 77).

In these settings, learning is not entirely cognitive, but a matter of 'touch, vision, taste, or smell – depending on the craft and its materials' (Delamont and Atkinson 2018, p. 77). They imply a difference between *cognitive skills* and *experiential knowledge*, where cognitive skills tend to refer to those that allow an individual to calculate amounts, consider spatial relations, and so on, whereas experiential knowledge refers to an embodied practical sense of material qualities. Thus, the notion of experiential knowledge yields *tacit knowledge* (Polanyi 1958)[10] and *indeterminate competence* (Jamous and Peloille 1970). The most familiar version of tacit knowledge in the sociology derives from Polanyi (1958). Polanyi's term implied a set of *rules* that are not written or explicitly recited, and which are not *known* by the person who skilfully follows them. The key idea is that this kind of knowledge cannot be reduced to rules or formula or conveyed through written or verbal instructions. Moreover, although the term tends to be treated as an individual possession that someone may have, it also refers to a kind of theory; the 'theory of the universe implied in our language' (Polanyi 1958, p. 80). As such, tacit knowledge is identified as an *indeterminacy* between 'formalisms (e.g., rules, sets of instruction, protocols, formulae) and practical experience' (Lynch 1997, p. 339). Indeterminacy that 'must be resolved' on 'the ground of unspecifiable criteria' (Polanyi 1958, p. 81):

> 'By watching the master and emulating [their] efforts in the presence of [their] example, the apprentice unconsciously picks up the rules of the art, including those which are not explicitly known to the master [themselves]' (Polanyi 1958, p. 53).

[10] In STS the concept of tacit knowledge was central in the origins of laboratory ethnographies, where most of laboratory work was characterised as matters of 'routine enquiry, skills, and tacit knowledge' (Latour and Woolgar 1979, p. 76). The notion offered a way to challenge the views that depicted rules of method in experimental practice as adequate accounts of what scientists do. Studies reported a problematic relationship between formal instructions and actual efforts to replicate experiments and technical protocols (Bloor 1976; Latour and Woolgar 1979; Collins 1985, 2010).

According to Polanyi, practical knowledge is embodied and cannot be expressed in rules of actions, in terms of formulae, or simple precepts, but is unconsciously learned – i.e., '[t]hey cannot be learned from a textbook' (Delamont and Atkinson 2018, p. 83). Lynch points out that the reason why this knowledge cannot be expressed is not because of people's inability to articulate their knowledge, neither it is a *hidden* kind of collective understanding, but 'it is concealed in a rather knowing way by interested parties' (Lynch 1997, p. 340). These kinds of knowledge and skills are worked on and worked out in practice, and it is the equally indeterminate skills of the teacher to find ways of transmitting such knowledge and skills (Delamont and Atkinson 2018).

As with craft knowledge, artistic performance, and sporting prowess, digital competency has the potential to share these indeterminate and tacit characteristics, i.e., the dependence on practical embodied knowledge that is not explicitly formulated. This poses some interesting questions for this research. For example, what kind of pedagogical strategies do teachers use to teach pupils digital competence? Are they fundamentally different to instructions learnt from other kind of competencies? If so, what features exhibit the production of explicit and implicit, verbally, and embodied instructions on digital competence in classroom situations?

2. Teacher and pupils' strategies

As stated in the previous section, anthropologists, and sociologists, under the influence of interactionist and interpretative approaches, began studying patterns of social interaction in educational settings over five decades ago (Hammersley 1974, 1976; Stubbs and Delamont 1976; Woods 1979; Ball 1980; Delamont 1983; Beynon 1985). One concept that came to be central to many ethnographies of education after incorporating interactionist ideas was that of *strategies*, which was based on the idea that peoples' behaviours consist of strategies for dealing with the problems that they see themselves as facing. This concept became popular because it directly challenged approaches coming from behavioural psychology (which dominated much of the previous educational research) that, not only tended to view behaviour from an external point of view, but also

in terms of negative or irrational behaviours, 'e.g., pupils' "failure" to be "motivated" in the classroom' (Hammersley 2018, p. 177).

Instead, interactionists in the classroom identified several types of strategies pupils and teachers would enact. For example, pupils' behaviours were often seen as *adaptative* strategies (Woods 1979), and teachers' behaviours in terms of *survival* strategies (Woods 1977) or *coping* strategies (Hargreaves 1978). The idea of strategies was closely linked up to that of *careers* – in the Goffmanian sense – as different strategies would lead to the formation of different identities. Additionally, there was a concern regarding the way perspectives and strategies on each side (teachers and students) interlocked or clashed with one another, usually generating some form of negotiated *classroom order* (Pollard 1982; Woods 1990).

There was also an interest in the identifying different discursive strategies that both teachers and students implement in the classroom everyday life. For example, according to Delamont (1983, p. 115), '[t]he teacher's first strategy is to impose her definition of the situation by talking most of the time' (text originally in italics)[11]. It has been reported how teachers commonly rely on strategies such as asking questions, lecturing, giving instructions, criticising pupils' (mis)behaviours, accepting ideas, encouraging pupils, and so on (Flanders 1970). In contrast, pupils' strategies are reported to consist mostly of doing what they are told, e.g., responding to the teachers' questions, collaborating with their peers, and occasionally asking questions to the teacher – although, there are obvious exceptions to this generalisation. However, what the literature tends to report in this matter is that teacher and pupils' roles and activities in the classroom dialogue are very well defined (Bellack 1966). For example, Barnes (1971), relying on tape recordings, looked at the teacher's formulation of questions and concluded that, on the one hand,

[11] Since W. I. Thomas's famous dictum – 'If men define situations as real, they are real in their consequences' (Thomas and Thomas 1928) – the *definition of the situation* has been a classic problem for sociologists to work out, in particular for those interested in examining social reality from the actors' point of view. However, what it means and how it can be located or grasped have varied from sociologists to sociologists (Schütz 1973; Berger and Luckman 1966; Goffman 1963). The way I interpret this notion, for the purpose of this thesis, will be further discussed in the following chapter, when discussing the analytical framework of this project.

teacher almost always know the answer to their questions, and in this sense, they are not genuine questions but methods to check pupils' knowledge.

On the other hand, Delamont (1983) argues that depending on the topic being taught the teacher would formulate questions differently. For example, in most of the subjects, the teacher would ask questions that demanded an objective answer. In a history class the teacher would ask about dates, names, and so on, whereas in science discovery, questions were formulated in a way that invited pupils to produce interpretations of events. This difference suggests that teachers orient their strategies to the requirements of different educational outcomes (e.g., learning *objective facts* vs learning methods of scientific discovery). Again, it is worth bearing this difference in mind when looking at the teaching of digital competence in practice to question whether we can determine the kind of knowledge being taught by the discursive strategies the teacher is implementing. In other words, what kinds of questions is the teacher asking? And how – if at all – are pupils answering them?

Teachers and pupils in the classroom – an asymmetrical relationship

Studies of classroom interaction document that much of the teachers' work can be summarised in their control over the definition of the situation. For example, Delamont (1983) argues that asking questions is a strategy teachers use to impose their version of what constitutes knowledge. She reports that the teacher 'imposes her definition of subject by direct lecture and questioning of pupils, playing down other perspectives' (Delamont 1983, pp. 119-20, text originally in italics). Thus, central to the control over the definition of the situation is the control over what constitutes valid subject knowledge and to control pupils' behaviours.

The teacher's control over knowledge is a well-documented feature of classroom life. Delamont (1983, p. 51) argues the teacher's 'most potent resource' is in fact 'her possession of, access to, and control over knowledge. She has knowledge and she defines what should and should not be learnt'. Moreover, whilst in everyday talk, participants of a conversation are expected to show involvement in the conversation, in the classroom

the teacher not only expects, but demands full attention. That they are entitled to do so is *taken for granted*, by them and the pupils in the class. Geer (1971) argued that, whereas in many social situations it is common to minimise the exercise of power or at least control its display, in school we do the opposite. Schools ongoingly 'support and legitimate [their] authority in a number of ways' (Geer 1971, p. 6). Geer (1971) proposed that the educational encounter is one of conflict, even in situations in which pupils are eager to learn and teachers are doing their job well. She argues that this is because in every teaching situation, 'the teacher is, at least temporarily, the superior and [their] pupils the subordinate' (Geer 1971, p. 5).

Hammersley (1976), on the other hand, argues that this asymmetry is actively sought, established, and maintained by the teacher. He insists 'on the exclusive right of teachers to decide publicly when a rule has been broken, to challenge the offender, and to decide on punishment' (Hammersley 1976, p. 110). Similarly, Woods (1979) also gives accounts of classroom encounters where humiliations or degradations are imposed on students – reminiscent of Garfinkel's (1967) accounts of successful degradation, and Goffman's (1963) treatment of spoiled identity. Through this approach, schools can be depicted as having similar effects to Goffman's total institutions (1961)[12]. It worth noting, however, that Hammersley's accounts were produced after observing the interaction of male teachers with male pupils of an urban boy's secondary school almost five decades ago. In relation to my own research, context, and generational differences (including the popularisation a more constructivist approaches to education and student-centred pedagogies) levels of strictness and explicit control differ from that of these accounts. Still

[12] In a way, the school can be seen as a kind of semi-total institution. In schools we find the common use of timetables, uniforms, control over behaviours, and so on, aimed at facilitating the process of shaping individuals into members of a society. Although to call a school a total institution may be stretching the term too much and I am not suggesting that all schools totally supresses its pupils, annihilating all sense of individuality, the institutional organisation of social life in schools has a series of consequences for members' identities and relationships, rights, and responsibilities, use of time, and space, in a similar way to the total institutions described by Goffman (1961).

asymmetry, control, and authority remain central in the accomplishment of classroom everyday life[13].

Moreover, as Sharrock and Anderson (1986, p. 91) suggest, 'there is no need to suppose, because teaching is sometimes a struggle-for-control, that it is generally so'. Instead, we should ask: 'when does control rise as a problem for teachers? And when it does, how then is it resolved?' (Sharrock and Anderson 1986, p. 91). Ethnomethodological studies of classroom order (particularly conversational analysists) have also observed the way lessons are organised interactionally and noted an *asymmetrical* distribution of conversational rights in which the teacher controls *every* aspect of the conversation: turn-taking, topic choice and duration, and definition of what has been said for all practical purposes (Paoletti and Fele 2004). Through an ethnomethodological lens, teachers' control and authority (Macbeth 1991) is seen as a practical accomplishment. These studies have also paid attention to the constitution of the students as one party to the interaction, a cohort, and how this is essential in the organisation and structuring of talk in the classroom (Payne and Hustler 1980; Macbeth 2000). Along with teachers' authority, the formation of classroom talk, as that between two parties (the teacher and the cohort of students) with asymmetrical rights and responsibilities constitutes a practical contingency. It is something both teacher and pupils orient to in order to accomplish classroom activities such as lessons.

Central to the study of control over knowledge in classroom interaction is the recognition of questions-with-known-answer sequences (Macbeth 2004). Questions-with-known-answers are reported to be a common feature of educational settings and have been examined in a large number of studies in the past fifty years. Some of the early studies include Bellack *et al.* (1966), Sinclair and Coulthard (1975), McHoul (1978), Mehan (1979), Heap (1985), Macbeth (2000), among many others. These kinds of questions are

[13] Other examples of ethnographic studies that have pointed at the conflictual aspects of classroom interaction and role of students in maintaining classroom order are Beynon and Atkinson (1984), Connell (1985), Davies (1982, 1983), and Delamont (1984).

often seen as essential for childhood socialisation (French and Maclure 1981); the Socratic method substantially consists of asking such questions (Macbeth 2004).

These can be identified by the way teachers produce an educationally trivial sequence of question-answer turns (Hull 1985). They are also known in the ethnomethodological literature as *question-answer-comment* (Q-A-C) (McHoul 1978) or as the *initiation-response-evaluation* (IRE) sequence (Mehan 1979). Typically, it is constituted by three turns: the teacher initiates with a question, followed by a student's response, and a teacher's remark on the adequacy or correctness of the student's response.

> 'Managing the cohort to produce and sustain this speaking structure, and the distinctive asymmetry of the teacher's rights and privileges within it, is the overwhelming practical evidence and achievement of a teacher's authority in the room' (Macbeth 1991, p. 281).

Analyses of these three-turn sequence in classrooms have substantially relied on prior work on natural conversation, especially Sacks's work and particularly the sequential organisation of adjacently placed turns. Sacks *et al.* (1974) argue that the organisation for taking turns in talk is fundamental to understand speech-exchange systems. One of the organising principles of these systems are what Sacks (1992) called *adjacency pairs*. For example, question-answer, greeting-greeting, invitation-acceptance/decline, and so on. By Mehan's (1979) account, the IRE sequence is assembled as two consecutive adjacency pairs: a question-answer pair, followed by an answer-evaluation pair. Each pair shows the regularities of placement and *tying* (Sacks 1992) found in the adjacency structures of natural conversation.

In classroom scenarios, students actively participate by providing candidate answers to the teacher's questions and their answers provide 'contributions to the teacher's ongoing "résumé-to-be" for the lesson' (Freebody and Freiberg 2000, p. 144). The teacher remains in control of such *résumé*, and in doing so, they set the parameters of what constitutes an adequate contribution and what the final and *correct* answer will be. These kinds of sequences deliver 'the last word, and sequence closure, to the teacher' (Macbeth 2004, p. 704). Thus, whereas corrections in other interactional situations have a function

often associated to some sort of repair, in educational settings, and more concretely, in the case of question-with-known-answers, corrections are strongly tied to accountable pedagogical aims. Inspired by those ideas, one may ask, how is *correct* knowledge over digital competency accomplished through classroom talk? And what sorts of pedagogical discursive formats are enacted?

The dialogue generated by questions-with-known-answer, of course, is not the only interactional feature of classroom life. However, because it is an efficient technology for maintaining control over body and talk, it is central for a study looking to analyse the production of curricular knowledge in classroom setting. Moreover, as I have previously argued, the three-turn sequence is not external to the pedagogical activity, but endogenously produced. Consequently, 'it is no surprise to find variations, adaptations, partial completions' (Jimenez and Smith 2021, p. 178).

Classroom tasks and instructions

A distinctive feature of classroom life is classroom tasks and their instructions. Inspired by Berger and Luckman (1966) and Schütz and Luckman (1974), Ball *et al.* (1984, p. 44) asserts that time is 'a profound phenomenological component of school life' that enters the taken for granted assumptions that operate in classroom encounters. Time is contingent, 'seen as a real coercive facticity with which we must continually reckon' with (Ball *et al.*, 1984, p. 45). Time is the organising principle for portions of practical activities in everyday school life, and the unit *per excellence* which organises time in the classroom is *classroom tasks*. Classroom tasks and how they are instructed are central to this thesis. That is because educational tasks are seen as the medium by which teaching and learning is accomplished in the classroom (Greiffenhagen 2008). As the case of Dr Cavendish's science class (Atkinson and Delamont 1976) shows us: when there is no clear task or instruction, little learning occurs[14]. Therefore, I am interested in the way in which a

[14] Atkinson and Delamont (1976, p. 137) report that Dr Cavendish, a science teacher they studied, did not do any *guiding* in her guided-discovery classes, instead she 'provided a context in which discovery could take place – a laboratory full of apparatus and textbooks – and left the pupils to play at science as they would'.

contextualised and moment-by-moment analysis of task instruction can reveal the way digital competence is realised as an object of educational knowledge in the classroom.

To do so, I borrow from ethnomethodology a sensitivity to the study of instructions and instructed actions, and therefore rules in action. This is because ethnomethodologists have already empirically investigated ways in which rules are employed in everyday situations and the way people continually discover their scope and applicability in the occasions in which they are used. For example, Garfinkel (1967) was interested in what coders had to do in order to follow coding instructions. His main finding was that coding instructions are, in an important sense, incomplete, and that *ad hoc practices* 'are used to recognise what the instructions are definitely talking about' (Garfinkel 1967, p. 22, text originally in italics). In other words, there is no intrinsic, prescribed, and definite way of following them, as instructions show indexical properties, following instructions pose problems of clarity, consistency, completeness, followability, factual adequacy (Garfinkel 2002, pp. 191-218). Instructions always need to be worked out in relation to the practical and material contingencies of each situation. Only in following them we can repair the ambiguity, incompleteness, and adequacy of instructions as an endogenous achievement of practical actions.

Following Garfinkel's work, instructions have been studied in a variety of activities and settings, particularly in education and training[15]. In these settings, the term *instruction* tends to take at least three (non-mutually excluding forms): instructions as *written text* (such as a manual, recipe, or a guidebook), as *teaching*, and as verbal *directives* (Lindwall *et al.* 2015). Instructions as written text is perhaps the notion of instruction that has received less academic attention. There are, of course, guides on how to write effective instructions, and some ethnomethodological studies of, for example, the properties of occasioned maps (Psathas 1979), how to follow instructions for the assembly of a chair

[15] For example, school laboratories (Amerine and Bilmes 1988), molecular biology laboratories (Lynch and Jordan 1995), classrooms (Macbeth 2011; Hester and Francis 2000; Greiffenhagen 2008; John and Cromdal 2016), handcraft workshops (Lindwall and Ekström 2012), sport coaching (Evans and Reynolds 2016; Evans and Lindwall 2020), surgery (Sanchez Svensson *et al.* 2009; Koschmann *et al.* 2011; Mondada 2014) and driving lessons (Psathas 1991; De Stefani and Gazin 2013).

(Garfinkel 2002), and of the recovery of the lived details of the resolution of a mathematical problem (Livingston 1986). Instructions in this sense can overlap with the other two, e.g., they can be used for teaching, and they can consist of a series of sequenced directives. The DCF is in itself a case for this. The framework is a written instruction for teachers to follow. However, as with any written instructions, it is essentially *incomplete*. This is because, as Garfinkel (1967) pointed out, the following of instructions requires various *ad hoc* considerations to enact in practice. In this sense, explicit instructions may present similar actionable properties to indeterminate skills.

> '[A]ttempts to clarify or further specify the instructions, does not solve the issue raised by Garfinkel. His argument is not that just *some* instructions are 'incomplete', but that this is an *irremediable* aspect of all instructions however formulated' (Lindwall *et al.* 2015, p. 146)

Instruction is sometimes more generally associated with the notion of teaching. For example, Mehan (1979) identifies three sequentially ordered phases of a typical lesson – opening, instruction, and closing – and argues that the instructional phase is 'the heart of the lesson'; where 'academic information is exchanged between teachers and students' (Mehan 1979, p. 36). This take on instruction as an educational process is not unique to ethnomethodology, but it is central to much of educational research, and it goes beyond the classroom setting (as it has been discussed in previous sections). The large majority of research, however, tends to focus on formulating prescriptive and normative approaches to pedagogy, commonly from a constructivist perspective (e.g., Cooper 1993; Ertmer and Newby 2013; Shreiber and Valle 2013). Which takes us to the third understanding of *instruction* ascertain social actions – orders, directives, and requests, 'designed to get someone to do something' (Goodwin 2006, p. 517).

In a way, this notion of instruction overlaps with the previous one, as teaching routinely involves the production of order, directives, requests, and so on. This form of instruction has been widely researched in a variety of institutional and non-institutional settings – from computer games to surgeries (e.g., Mondada 2013, 2014) – but under-researched by educational scholars. Instead, it has been scholars of language and communication who have taken an interest in this form of instruction. Their work traditionally focused

on social variables as aspects of sociolinguistics, and saw such instructive actions in terms of *politeness*, *power*, and *solidarity* (e.g., Brown and Levinson 1978; Ervin-Tripp 1976). More recent work has problematised the static and formalistic treatment of these actions, to focus on studying the way the design of these kinds of instructional utterances displays the speaker's orientation to contingencies associated with the recipient's willingness or ability to comply (Curl and Drew 2008).

This notion of instruction is central to this thesis, as the fieldwork showed that much of what happens in classrooms is pupils being repeatedly told what to do (e.g., to pay attention, to stay quiet, to open their books, to raise their hands, to speak next, and so on). As Cook-Gumperz (1977, pp. 109-10) point at, '[s]chool learning concerns the receiving and giving of explicit instructional sequences which are algorithms for action'. Thus, some of the questions this literature inspires are: What kind of tasks are designed to develop learners' digital competence? Which kind of instructions are crafted to help pupils accomplish these tasks? And what contextual and practical contingencies shape the *in vivo* delivery of task instructions? This leads us to the next section, as the use of certain hardware and software for tasks and task instructions constitute some of the contextual and practical contingencies this thesis is interested in examining.

3. Digital technologies in the classrooms

Digital technologies – and this is, of course, a gloss for a large array of material and virtual artefacts – are often seen as cultural tools; 'tools that mediate and shape cognition, attention, and material action' (Thorne and Hellermann 2022, p. 237) across contexts and time. How this might be the case (in a very local and context specific way) is of interest to this thesis. More concretely, I am interested in the way computer software is brought into classroom tasks, whilst also being tools for instruction, and the implications of this for the knowledge that these activities produce. In considering the use of digital technology in the classroom, I briefly discuss the literature of educational technology (specifically the use of computer-based systems), identify some gaps in the literature, and highlight some of the contributions of STS to the study of technology that can inform the study of educational technology.

The history of the study of computers in the classroom is a relatively new one, and one that has evolved alongside the integration of these technologies into educational practices. The 1980s and early 1990s were witness to much debate about the efficacy of computers in the school curricula as they were being first integrated into school settings. Key to these debates were the pedagogical advantages and disadvantage of, for example, word-processing programs *versus* pen and paper for learning to produce written work. During the 1990s the main concern was centred on the ways in which to integrate digital technologies into the classroom, and theories about the sort of cultural and institutional changes that a school needed to experience to adapt to the new technological demands emerged (Fullan and Stiegelbauer 1991; Bricker 1995; Ertmer 1999; Parker and Ertmer 2008; Ertmer and Ottenbreit-Leftwich 2012). For example, Bricker (1995) extended the concept of *first-* and *second-order change* (Cuban 1993; Fullan and Stiegelbauer 1991; Hadley and Sheingold 1993) to categorise the obstacles for teachers integrating technology into their practice into *first-* and *second-order barriers* to change.

According to Ertmer (1999, p. 48), *first-order barriers* refer to 'access to computers and software, insufficient time to plan instructions, and inadequate technical and administrative support', whilst *second-order barriers* 'include teaching beliefs about computers, established classroom practices, and unwillingness to change'. The fact that technologies would enhance students' learning experience was largely *taken for granted*. The body of literature that cropped up to support this process seems to be largely designed to convince schools and teachers of the benefits of integrating educational technologies (see Bond *et al.* 2019 for an overview). This literature falls under the Ed Tech banner, and although it has been argued that so-called Ed Tech movement is but a loose assortment of technologically minded academics (Selwyn 2010), many of the arguments centre on validating the benefits of digital technology in and for education and take the form of *means-end* thinking (see Cuban 2001 for a critique).

Nowadays, the integration of computer-based systems (particularly software applications and computerised devices such as desk computers, laptops, and tablets) seems almost irreversible, and the factors involved in the implementation of digital technology in schools in the UK were already well known. However, 'evidence of digital technologies

producing real transformation in learning and teaching remains elusive' (Luckin *et al.* 2012, p. 8). Moreover, the debates seem to have shifted towards a growing concern with defining and measuring digital skills in relation to wider social issues such as life chances and socio-economic inequalities. For example, Livingstone and Sefton-Green's (2016) book, *The Class: Living and learning in the Digital Age*, looks at some of the tactics used by teenagers in their everyday life (inside and outside the classroom) to prepare themselves for the opportunities and challenges they anticipate their future will bring about. The authors focus on discussing how social class and social capital affect personal choices and interests. A literature looking at new forms of online and hybrid education has also been emerging for over a decade (e.g., Orton-Johnson 2007, 2009; Crick 2020), which became particularly relevant during and after the Covid-19 global pandemic.

The interest in the pervasiveness of digital technologies in everyday life and in the way they enable new forms of social life, transcends the educational sphere and spreads across various fields of research. This is one of the main focuses of the emergent *digital sociology* (e.g., Orton-Johnson and Prior 2013; Marres 2017), with some studies looking at the ubiquity of the Internet, the entanglements between the online and offline worlds, and the datafication of selves, among many other topics (see Markham 2008, 2011; Markham and Tiidenberg 2020; Lupton 2020 for some examples). Education is, however, a key setting for studying the increasing pervasiveness of digital technologies in everyday life, as schools are socialisation *loci*. Paradoxically, 'the educational use of technology has remained on the periphery of the sociological gaze' (Selwyn 2013, p. 159). The large majority of the educational research has failed to look at the way computer software is *actually* used in practice, in the accomplishment of classroom tasks (Selwyn 2013), and ethnographic accounts detailing situated practices of the use of technology for classroom activities are rare. Some exceptions include Greenleaf's (1994) study of the use of a word processor to teach writing in a second language, and Greiffenhagen's (2012) study of teachers' interventions during pupils collaborative work for the task of making a visual representation of the play Macbeth using a digital storyboarding tool. There are also Maeder's (2012) account of situated cognition and cooperation through ICT use in classrooms and Birmingham *et al.*'s (2022) study of the three-way interactions between teacher, pupils, and technology in collaborative work in the classroom.

Similar concerns are apparent in STS regarding the study of the use of computer software. Although scholars have explored the politics and infrastructural assumptions of digital tools in and for science widely (e.g., Ribes and Boweker 2008; Lee *et al.* 2006), STS studies of the off-the-shelf software suites such as Microsoft or Google Workspace are rare despite their ubiquity in scientific settings. The contributions of these studies include, for example, the notion of *sociomateriality* derived from STS theories of hybridity (i.e., Latour 1993; Haraway 1991; Barad 2003), used to describe the material and semiotic aspects of software in context. The idea underlying the notion of sociomateriality is that the material properties of technology acquire meaning by virtue of the context in which they are used, i.e., the organisational practices of a given setting infuse the technology with local significance (Orlikowski 2010; Leonardi 2011).

Some researchers have argued that educational research has ignored the question of 'how educational practice is affected by materials' (Sørensen 2009, p.2) and, in dealing with this gap, they have attempted to bring the notion of sociomateriality to educational research (for an overview see Fenwick *et al.* 2011). These scholars, usually gathered under the eclectic umbrellas of post-humanism and new materialism, tend to see learning as: 'an effect of the network of the material, humans and non-humans' (Fenwick *et al.* 2011, p. 6). Through this lens, teaching and learning are seen as effects of assemblages. For example, for Sørensen (2009), everyday educational activities are critically shaped through the material. In particular, she discusses how entities come to exist (from blackboards to curriculum policies) and uses *actor network theory* (ANT) to articulate ideas of hybrid assemblages. For Sørensen (2009), 'things matter not as discrete and reified objects with properties, but as effects of dynamic materialising processes that cause them to emerge through gatherings and to act in indeterminate entanglements of local everyday practice' (Fenwick *et al.* 2011, p. 1). By those terms, learning cannot be reduced to something that happens between humans but is embedded and enacted in networks of lived and inert things, human and non-human.

The Gibsonian (1979) notion of *affordances* has also been further developed to discuss human-computer interaction in various settings (Norman 1999, 2002; Hutchby 2001, 2003), and 'to delineate how material objects and digital systems alike both enable and

constrain particular forms of social action' (Vertesi 2019, p. 370). The argument is that, although the properties of off-the-shelf software suites are highly *blackboxed* (Latour 1987, 1999)[16], one can study the software properties that 'come to matter *in practice*' (Vertesi 2019, p. 378). For example, Gillespie (2006) looks at aspect of technical copyright regulation and the way some of the arrangements included in music software undermine users' sense of agency in practice. For Hutchby (2003, p. 582), the notion of affordances directs the sociological gaze towards 'the empirical question of embodied human practice in real time situated interaction involving technologies'.

Considering this shift to materiality, some of the key ideas STS has to offer may prove useful to educational research, particularly those interested in education in technology-rich settings and in understanding the way humans and their tools co-evolve over time (Thorne and Hellermann 2022). In this thesis, the notion of affordances informs the approach to the analysis of the material and practical contingencies of instructions of in classroom activities that involve the use of software.

4. Social construction of scientific and technological knowledge

In this section, I reflect further on the extent to which STS can contribute to the study of classroom activities by considering some of the main contributions of the sociology of scientific knowledge – in particular those coming from laboratory ethnographies. The aim is to lay the groundwork in identifying key properties from scientific settings, as sites of knowledge production, and how they vary from those of educational settings. To contribute to this, I engage in a discussion over the difference between knowledge production in *mock-up versus real-life* situations.

As with the educational studies (depicted in this chapter), STS experienced a series of changes deriving from the criticisms raised towards functionalism, objectivism, and realism in their own terms. Consequently, they both have obvious differences, whilst also

[16] In STS *blackboxing* is used to describe the way the inner workings of technology and science is often opaque. That is, what is made visible is the inputs and outputs of a process, rather than the internal complexities. These are often only made relevant when something goes wrong.

some evidence of common influences. Moreover, although the variety of disciplinary backgrounds involved in STS stretches across the humanities, social sciences, and natural sciences, and it can be characterised as eclectic and inconsistent – hosting a variety of sometimes opposing views – some essential features can still be drawn. Among them, there are ontological debates about the nature of reality and the basis for acceptance of scientific truths (realism vs. anti-realism), debates about the methodology of the social sciences (closely related to the positivist vs. anti-positivist controversy), and epistemological debates (e.g., between social constructionism, semiotic-based actor network theory and ethnomethodology).

To understand some of these debates, we can look back at the *linguistic turn* that occurred after World War II, when scholars begun to argue that traditional epistemological topics – such as *rationality* and *truth* – could not be isolated from the immensely variable linguistic and practical circumstances in which they were produced and embedded. Critical to this understanding was Kuhn's (1962) history of science study of scientific paradigm shifts. His work raised an important criticism of Popper's (1959) *principle of falsification of scientific hypothesis* and Mertonian *norms in science* (Merton 1942). Kuhn's work, alongside others – such as Lakatos (1978) and Feyerabend (1975, 1978) and the readings of other thinkers' works, such as that of Fleck (1935), Mannheim (1936), Wittgenstein (1989 [1967]), Winch (1958), among others – led to what came to be known as the *sociological turn* in STS. This turn – which can be seen as a Kuhnian-type *paradigm shift* in itself – was solidified in the development of the sociology of scientific knowledge (SSK) and the consolidation of both the Strong Programme of the Edinburgh School (Bloor 1981; Barnes and Edge 1982; among other contributions) and the Empirical Programme of Relativism (EPOR) of the Bath School (Collins 1981). Underlying those programmes there is the idea that knowledge, even scientific knowledge, is *socially constructed*; that science is not simply a mirror of nature.

The idea of *social construction* has many origins in classic sociology and philosophy. We can see it in Marx, Weber, and Durkheim, but it also integrates ideas coming from phenomenology and symbolic interactionism. The phrase 'social construction', however, was introduced to STS by Berger and Luckman (1966). In their treatise on the social

construction of reality, they argue that 'stable social institutions emerge from highly flexible possibilities at the individual and interactional level, which become externalised and objectivated, eventually being taken for granted as real' (Lynch 2016, p. 101). In other words, knowledge, although *constructed* through these interactions, is often taken as objective and truthful, and institutions (which are also some kind of Schützian constructs) are then treated as externally intrinsic realities. The way these realities are constructed through processes of interpretation undertaken by scientists was central to the Strong Programme. As Bloor puts it:

> 'Objectivity and rationality must be things that we forge for ourselves as we construct a form of collective life. So, the work of Copernicus is undone. Human beings are back in the centre of the picture. Things that had seemed distant become close; product is replaced by process. Apparent universals become variable and relative. The things we had seen ourselves as answerable to, we are now answerable for' (Bloor 1983, p. 2-3).

Collins (1981) also argued that there are no objective and inherently existing facts upon which scientific knowledge can be based. In other words, the data that scientists use do not possess inherent meaning. Instead, they must be interpreted, and in principle, they can be interpreted in different ways. In other words, there is *interpretive flexibility.* Pinch and Bijker (1984) extended the notion of interpretive flexibility to formulate a programme for the study of technological innovation, namely the Social Construction of Technology (SCOT). The principle underpinning this programme was that different meanings can be attached to the same technological artefact. Pinch and Bijker (1984, p. 406) built 'a sociology of technology which treats technological knowledge in the same symmetrical, impartial manner that scientific facts are treated within the SSK'. This means that, when using this approach in the study of technological innovations, social scientists need to consider the various designs competing at the outset of a new technological device symmetrically and neutrally. Studies in this tradition (e.g., Mackenzie 1990, 1996; Mackenzie and Wajcman 1985; Shapin and Schaffer 1985) help to dispel the idea 'that the progress of technology is inexorable, and that the technology we are confronted with is (or was) unavoidable' (Sharrock and Button 2011, p. 214).

Although the empirical relativist rejects the idea of causality, the programme offers similar analytical difficulties to the Strong Programme[17]. They both focus on producing descriptions of significant scientific experiments or technological innovations, whilst relying on practitioner's published and unpublished accounts. If the aim is – as it is the case of this thesis – to find out what *actually* occurs in practice, these programmes offer little material to fill the gap. This does not mean that this approach has no value. For example, these approaches could be appropriate if studying the processes by which the notion of *digital competence* became a critical element of the curricular reform, or if studying the *social shaping of technology* (MacKenzie and Wajcman 1985) such as the Hwb[18]. It would be, in fact, a useful reflective tool for some of the work on Ed Tech. Indeed, one of the main critics to the Ed Tech literature is that its arguments are often too focused on demonstrating the benefits of digital technology for education while taking for granted the politics of its production (Boody 2001, Selwyn 2012).

These researchers tend to produce neat analysis and models of technology, which separate technology from other social entities, thus turning technology into things totally apart from those who produce it and use it and overlooking its by-products or unintended consequences (Selwyn 2010). Educational technologists (among others in the industry, and those whom they sponsor, whether directly or indirectly, to engage in research) are largely preoccupied with proving the efficiency of hardware and software for educational purposes. Such has been the enthusiasm and expenditure vested in educational computing over the last years that any suggestion of doubt is often dismissed as being *anti-progress* (Selwyn 2002).

However, this thesis is not concerned with the study of the material and cultural conditions that allowed the curricular change towards the DCF, nor with the process of which beliefs around digital competency are accepted in society or debated among

[17] Among some of the critiques there is Latour's (2003), who argues that it is a mistake to assume that the world is inherently made of social stuff, and if that line of thought is followed the analysis is likely to fall into some sort of *social realism*.

[18] The Hwb is a digital platform for all teachers and learners in Wales that gathers various programmes and applications approved by the Welsh government to enable digital education.

different groups. It does not attend to which technological innovation became integrated into the classroom's furniture. Instead, this study is concerned with how knowledge is produced through locally and temporally educational orders, constituted through everyday interactions between classroom *members* ('teachers' and 'pupils') – and, in particular, with the way teachers and pupils orient their action to the accomplishment of certain formal educational objectives associated with the DCF. This study does not pre-assume what *digital competency* is, nor pre-assume groups of actors with clearly defined interests. Even if they do exist, and they were/are relevant social actors to bear in mind when studying how the DCF was integrated into the curricular reform, these assumptions do not contribute to building a detailed understanding about the actual practice of teaching digital competencies.

In the next section, I turn to the literature of laboratory studies and the way these studies take the attention to the everyday practices that members engage with in the laboratory to produce scientific and technical knowledge.

A factory of 'facts'

In this section I briefly review three classic laboratory ethnographies (Latour and Woolgar 1979; Knorr-Cetina 1981; and Lynch 1985) to attend to the way these studies have approached the study of the production of knowledge in scientific practice.

Latour and Woolgar (1979) provided a detailed account of the way in which they saw the process of scientific fact construction operating with respect to the TRF/H (Thyrotropin Releasing Factor/Hormone), a short chain of amino acids. Their focus was explaining the processes by which lab practitioners remove the social and historical circumstances for the *fabrication* of facts.

> 'Our claim is not just that the TRF is surrounded, influenced by, in part depends on, or is also caused by circumstances; rather we argue that science is entirely fabricated out of circumstances; moreover, it is precisely through specific localised practices that science appears to escape all circumstances' (Latour and Woolgar 1979, p. 239).

Although this claim was not completely new (see Collins 1974; Knorr-Cetina 1977; Woolgar 1976), the authors offer a thorough sociological account of the circumstances which make the TRF a stable object of knowledge. They argued that the substance scientists in the lab were studying was not just conditioned by *social forces* (in a structural sense), but it was *constructed* by and *constituted* through what they called *microsocial phenomena*, i.e., the series of practical operations that form the everyday activities of scientists in the laboratory and 'by which inscriptions are superimposed and accounts backed up or dismissed' (Latour and Woolgar 1979, p. 236)[19].

Another key idea in laboratory ethnographies is Knorr-Cetina's (1981) notion of *situatedness*. The argument is that the *cognitive* operations of scientific enquiries display 'a social process of negotiation situated in time and space rather than a logic of individual decision-making' (Knorr-Cetina 1981, p. 152). In other words, whatever rationality might be determining the operations by which knowledge is produced, it is not operating in a vacuum, but it is context dependent. These kind of observations about the construction of knowledge lead me to raise further empirical questions such as: what practical operations do teachers and pupils enact to make notions of digital competence stable objects of knowledge? And how do the specificities of situation shape the *rationality* of these operation?

However, one of the critics that ethnomethodologists have formulated regarding social constructionism is the idea of meaning as the product of interpretation. To explore this point in more detail I discuss the *shop floor problem* through Lynch's (1985) laboratory ethnography. Garfinkel (2002) borrowed the notion of the *shop floor problem* from aerospace engineering researchers (Beryl Bellman and colleagues at the Rockport Conference of the World Design Forum in 1994) discussing their real-world experience as consultants to McDonnell Douglas, an American aerospace manufacturing corporation. Concretely, the notion refers to the attempt to reconcile the routine and

[19] One of the main criticisms of Latour and Woolgar's ethnography is that they approach the scientific practice from afar, and they were satisfied with being unfamiliar with the lab setting. This has been criticised by Lynch (1985, 1993), and implicitly by Knorr-Cetina (1981) and Collins and Evans (2007). My position regarding this matter will be discussed in the methodology chapter.

practical actions of the workplace with the accounts of that same activity (Garfinkel 2002)[20].

Lynch's considers this problem is his study of the everyday activities in a neuroscience laboratory by focusing on the production of technical work and technical talk on the lab floor (referred as *shop work* and *shop talk* respectively).

> 'Shop work has embodied visibility to persons manipulating items of apparatus, laboratory specimens, and preparatory chemicals at the work bench. It has the visibility of shop talk: talk which accompanies the work as the work is underway; not talk about the work, talk which is part of work' (Lynch 1985, p. 10).

Lynch argues that these accounts – which mostly come in the form of scientific *data*, used by scientists in the laboratory – were inseparable from the situations of their use. In this way, he broke away from social constructionism and reformulated his sociological interest, not in an explanatory ontology, but in a descriptive analysis of the lab-specific-work.

> 'It is the formats of visibility constituting "data" that are considered here to be the most critical exhibits of the work of science [...] What are considered here to be meaningful exhibits of "the data" are such instances of the data under argument, the data under a reading, or the data as documents of an announcement or claim, as can be witnessed in actual occasions of lab work' (Lynch 1985, pp. 10-11).

Additionally, in looking at the locally organised collaborative work that produces objective accounts, Lynch examined occasions in which artifacts were discovered, described, and argued over. For him, these also constituted perspicuous situations of laboratory work. Artifacts were *discoveries* in the sense that they were not aspects of the microscopic

[20] The notion of the *floor shop problem* has also influenced studies of technology in the workplace (e.g., Suchman 2007) and interested scholars from the computing sciences and engineering, especially in the area of computer supported cooperative work (CSCW) and human-computer interaction (see Randall *et al.* 2021 for an overview).

analysis in any formal way, but they were unanticipated occurrences. They were often described as intrusions or distortions (e.g., a scratch on a microscope lens). According to Lynch, the observability of these artifacts derived from the instrumental conditions of their perception, i.e., its perceptivity 'is a technical accomplishment in laboratory work' (Lynch 1985, p. 82). He showed that collectively perceiving objects such as artifacts demanded certain competencies: concretely, the capacity to formulate methods talk such as a competent use of the notions of *technique* or *instrument* as a matter of practical action. Lynch's observations indicated that artifacts were used by lab scientists in their accounts in ways that were inseparable from the particular phenomena studied and their discursive and material circumstances.

Lynch's contribution, and the *shop floor problem* more generally, offers an orientation to consider what teachers and pupils actually do with their bodies as they instrumentalise digital technology, and with their talk, as they produce an account of these activities. in short, it leads us to consider what is specific about classroom-specific-work.

The classroom is not a lab

To consider further what classroom-specific-work might be, I draw on comparisons made between educational and medical/scientific settings – and, in particular, Atkinson and Delamont's (1976) reflections of the analysis of two educational *guided discoveries* (a science class at a secondary school and a bedside teaching of medicine in a medical school). The case of the science class is particularly relevant as the principles of guided discovery discussed by the authors resonates with the pedagogical approach that the New Curriculum for Wales intends to enact. In other words, a heuristic approach[21] that aims

[21] These are approaches by which students are not just given subject content to reproduce, but they are somehow actively involved in developing methods to discover relevant knowledge by themselves (Armstrong 1989).

at shifting the role of the teacher from that who *imparts* knowledge to that who *facilitates* it[22].

As such, the New Curriculum for Wales is not the first policy attempting to support these kinds of pedagogies. The Nuffield Science curricula can be seen as one of its precedents. Moreover, as with the New Curriculum for Wales's emphasis on teaching through real life examples, the Nuffield Science curricula also insisted on the need to do *real* experimentation in science lessons, rather than 'the empty unrealistic recapitulation of classic demonstrations' (Atkinson and Delamont 1976, p. 131). The principle behind it was that doing *real* science would enable the accumulation of practical knowledge, i.e., it would develop *ways of knowing* applicable to sciences, rather than just the retention of *facts*, and thus it would better equip students to become scientists. However, this notion of *reality* is somewhat inaccurate. As Atkinson and Delamont (1976, p. 141) argue, they 'are carefully managed 'versions' or 'reproductions' of certain types of reality'. In other words, if medicine and science are socially organised ways of producing stocks of knowledge about the natural world, *mock-ups* provide occasions for the methodical reproduction of such knowledge.

> 'The relationship between 'reality' and mock-ups' or 'practice' is dialectical. It is particular features of 'reality' that are selected and reconstructed to produce the 'working model'. In the same way, the model itself provides an interpretive framework whereby the reality may in turn be understood. Through these 'reality-like' experiences, students amass a stock of typification and recipes for action in typical circumstances in preparation for situations that are 'for real'' (Atkinson and Delamont 1976, p. 141).

Brown *et al.* (1989) compared the school culture with the disciplinary cultures of scientific practice. The authors observe that classroom and professional practices are differently situated, and they differentiate between classroom pedagogy, and *authentic*, professional pedagogies to anchor an argument about the primacy and authenticity of the adult worlds

[22] This principle incarnates much of the hopes put into the integration of digital technologies in the classroom (see Glassett and Shrum 2009; McKnight *et al* 2016). Namely, a shift in the role of the teacher, from a *content* to a *learning* specialist.

of professional practice. The authors argue that 'classroom tasks... fail to provide the contextual features that allow authentic activity' (Brown *et al.* 1989, p. 32-3). Rather than cultures of authentic practice, in classrooms students find 'the cultures of school life itself' (Brown *et al.* 1989, p.34), which – I would add – are authentic in their own way.

STS has mostly been concerned with the work of scientists, engineers, and other technicians in their work environment; secluded places such as laboratories where *specialist expertise* – to borrow Evans and Collins (2007) term – is the rightful trading coin of the social actors that inhabit those spaces. However, school classrooms are settings of a different nature. Some of its features have been discussed in this thesis – for example, the asymmetrical rights and privilege over knowledge and behaviour between teacher and pupils, and language games of various sorts that organise classroom discourse (e.g., didactic presentation of knowledge, questions-with-known-answers). Because of the mandatory nature of primary education, schools are not secluded places, but most people have gone through them. Moreover, they are spaces where subject knowledge is introduced and reproduced at a basic level. It is its recognised institutional qualities that differentiates it from other settings studied in STS. We tend to designate a different epistemic level to the knowledge (re)produced in these two types of settings, the actors that constitute them, and their relationship. In short, the classroom is not a laboratory in a traditional sense, and therefore, considering STS accounts about the production of knowledge in an educational study, needs to be mindful of the *context-specific conventions* that may change the nature of the phenomena.

5. Conclusion

There are some good reasons for having what could be seen as an educational project (the implementation of a curricular reform in practice) in an STS pathway. Some of those have to do with funding. Others – perhaps less intentional but more significant – with the opportunity to bridge between two apparently mutually excluding areas of social research – in this case, brought together to inform the analysis. As such, the review of these literatures, has not only aimed at establishing the foundations for an analytical approach, but also it has explored some ways STS and educational studies can inform each other.

I started by reviewing some of the contributions of the *new* sociology of knowledge, how the authors of this movement put the content of education, methods of teaching, and the way in which knowledge is organised in the school curriculum, at the centre of their research agendas. Then the discussion focused on the contributions of educational ethnographers. In particular, that the most recurrent and biggest finding of classroom ethnographies is that '[w]hat policy makers, politicians, head teachers or governing bodies think is happening in classrooms simply is not what actually goes on' (Delamont 2016, p. 9). Thus, a need to examine how curricular content is *actually* enacted in practice. Then the focus shifted to the phenomenological and ethnomethodological contributions to the understanding of the processes of socialisation and knowledge transmission, through shared stocks of knowledge and interpretive procedures. Another set of literature was also reviewed to discuss the way learning is not entirely cognitive, but that an embodied practical sense of material qualities is necessary (Delamont and Atkinson 2018). This discussion brought on issues of body technique (Mauss 1973), *indeterminate competence* (Jamous and Peloille 1970) and *tacit knowledge* (Polanyi 1958) into the conversation. The argument is that as with craft knowledge, artistic performance, and sporting prowess, digital competency has the potential to involve the mastery of tacit practical embodied knowledge.

In the second section of this chapter, I turned the focus of the discussion to what interactionist and ethnomethodological studies have commented regarding the dynamics of classroom life. In particular how these dynamics are strongly shaped by the teacher's control over the definition of the situation (Delamont 1983), and how the rights, responsibilities, entitlements, control, and authority are emphatically asymmetrical aspects of the relationship between teachers and pupils (Geer 1971; Hammersley 1974). Teachers control *every* aspect of the conversation: turn-taking, topic choice and duration, and definition of what has been said for all practical purposes (Paoletti and Fele 2004). Part of this control is exercised through the enactment of the three-turn sequence (McHoul 1978; Mehan 1979) and in particular – although not uniquely – the pedagogical use of questions-with-known-answers (Freebody and Freiberg 2000; Macbeth 2004). This section also addressed the topic of instructions and classroom tasks. A consideration of Garfinkel's (1967; 2002) reflections on the issue of incompleteness and ambiguity of

instructions offers a sensitivity towards member's methods used to repair and realise the followability of instructions.

In the third section, I discussed the study of technology in the classroom and identified some gaps (already reported) in the literature: Both educational and STS studies that look at the situated uses of off-the-shelf software suites such as Microsoft or Google Workspace are rare. This, moreover, is one of the areas where these two fields of study can benefit from each other. I proposed, for example, one way is to explore the transferability of certain notions, e.g., software *affordances* (Gibson 1979) as interactional affordances (Vertesi 2019) to study the use of software suites in the classroom.

Finally, the chapter turned back to studies of knowledge, but this time from the perspective of the sociology of scientific and technological knowledge. In this section, I discussed further the legacy of Berger and Luckman's (1966) social constructionism in dismantling notions of rationality and objectivity in science studies (Bloor 1981; Barnes and Edge 1982; among other contributions). By those terms, scientific knowledge and technological innovations are always social products. This section also included a brief review of some laboratory ethnographies (Latour and Woolgar 1979; Knorr-Cetina 1981; Lynch 1985) and their contribution to the study the social construction of knowledge by looking at scientific practice, detailing the way objectivity and rationality is *fabricated* out of *situated* practical operations. Drawing on the notion of the *shop floor problem*, led me to pose questions about actions and their accounts as setting-specific-work. To consider further what might be classroom-specific-work, I drew on a discussion between mock-ups in science and medical educational and *authentic* practice in action (Atkinson and Delamont 1976). The conclusion was that classrooms have different *context-specific conventions* from scientific laboratories (the common setting of STS research) that need to be taken into consideration. Which is not to say that laboratory ethnographies cannot be drawn upon to study the production of knowledge in classroom settings (nor that educational ethnographers cannot inform STS studies), but that detailing the specificities of the setting is one major analytical concern in this thesis.

In this review of the literature, I discussed various theoretical approaches, analytical interests, and topics of research to foreshadow some of the ideas and concepts that are

used in further chapters to articulate and analyse what I observed and recorded during my fieldwork. This literature review also lay the foundation to articulate research questions that are malleable, intertwined, and reformulated through the findings chapters. As indicated in Chapter 1, I am interested in examining how *the digital* is made intelligible to members of a classroom as a matter of competence, and I am equally interested in producing an account of how the DCF is enacted in practice. These interests are in a way, two sides of the same coin, and are used to articulate the following research questions:

i) What is practically involved in the enactment of the DCF?

ii) What role does technology play in these enactments?

iii) How are notions of digital competence accomplished in the classroom?

iv) What kind of contingencies arise?

How I went about conducting the fieldwork and the analysis that allowed me to answer these questions is the focus the next chapter.

Chapter 3: Notes on an ethnomethodologically informed ethnography

For a project concerned with the study of the situated production of knowledge practices, ethnography poses itself as the most suitable way of approaching this topic. I act under the conviction that, as Atkinson (2015, p. 13) argues, ethnographic projects can account for 'the socially shared practices that make everyday life possible', displaying the 'local', the 'concrete', and the 'practical' whereby the accomplishment of everyday life takes place in specific settings. Atkinson (2015, p. 3) also insists that, if done adequately, ethnography can be 'the most faithful way of understanding the social world' because its commitments are to the understanding *of* and *from* people's social worlds. For this, ethnographers must not only inhabit the same space for a period of time, but participate in their everyday life, and learn their ways of accomplishing their everyday life. The principle of the possibility of *any* faithful account is to be found 'in the common humanity shared by the researcher and by the researched' (Atkinson 2015, p. 5). In this sense, Atkinson argues ethnography is a 'profoundly ethical' and 'deeply humane' form of social research.

Ethnography, however, is a term used in different ways by different people. Broadly speaking, it is associated with qualitative enquiry, interpretative research, participant observation, and other types of field methods. In this thesis, the sense of use of the term ought to be understood in relation to the Cardiff School of Ethnography and its commitments (Delamont 2017). By the Cardiff approach, ethnography is not a method, but a sensibility to the study of social phenomena. Moreover, doing ethnography Cardiff style is associate it with 'doing it tidy'. In the School's manifesto, Smith (2017) refers to this expression[23] as a logo for the Cardiff way of conducting ethnographies. The sense of tidiness they invoke is not an avoidance of the complexities and messiness of social life, but on the contrary, it invites attention to how people find order and manage mess in their everyday life. In other words, to account for how *order* is socially, locally, and situationally

[23] For locals in South Wales, '"tidy" is a positive term, meaning "good" or "pleasing" or agreeing in the affirmative' (Smith 2017, p. 50).

accomplished. In this approach, 'doing it tidy' also implies, an 'openness to a wide range of approaches, theoretical influences, field sites and means of doing fieldwork' (Smith 2017, p. 51).

In this sense, there is a series of sociological and philosophical traditions that have strongly influenced my sociological imagination (among them symbolic interactionism, phenomenology, and ethnomethodology). Thus, the project recruits a series of ideas and concepts from various authors from these traditions to help articulate a methodological approach to the study of the world I describe, report, and analyse in this thesis. These influences fit together in the following way: the principle is that people act on the basis of meanings and meanings emerge from (within) the interaction with others (Blumer 1969). Intersubjective understanding is possible because people share a community of space and time that allows us to believe in a series of taken for granted assumptions about how particular types of situations will proceed (Schütz 1953), and these are situationally and locally assembled as objects, publicly available to members to analyse and account for (Garfinkel 1967). These different schools of thought have many points of agreement, but also many disagreements. In this sense, this thesis constitutes an attempt to integrate ethnomethodological observations, ideas, and interests to inform an ethnographic study, and in doing so, I purposely look for the points of coincidence and avoid engaging with the discussions of disassociation.

In the following pages, I discuss the methodological issues that I found pertinent when characterising this project. Thus, the intention is to describe what was done in terms of the methods for determining the field and accessing it (the first part of this chapter), but also in terms of the way observations and recordings were arranged and carried out (the second part). Finally, this chapter also discusses where to situate the study in terms of logics of inquiry (the third part).

1. The school

In this section, I describe the process of locating the school as a potential site, negotiating its access to it, and arranging fieldwork. The section also includes an ethnographic

description of the school to evoke recognisable – even if anonymised – features of the kind of school it is and why it was chosen as an adequate site for this study. This narrative is a synthesis of the history of the school as told by the teachers. The accounts were recollections that teachers produced in informal conversation at different points during the fieldwork.

Choosing a site – one school among hundreds

In ethnographic research, access to the research field is often recognised as a difficult process (Johnson 1975; Burgess 1984; Hammersley and Atkinson 2007). In the field of educational ethnography, the interest in this topic is reflected in several methodological discussions. Some examples can be found in the collections edited by Burgess (1985, 1985), Walford (2002, 2008), and Delamont (2012, 2016). Because access is seen in such a problematic way, it is common that the problem of access is solved in the strategic choice of a site. For example, by choosing a site with which the researcher is already familiar or has some sort of social links. Walford (2008) suggests that a better solution to the problem of choosing a site is to identify a *leading-edge site*, meaning for example, a school that is known for its trailblazing work in information technology. This method of site-selection was used in Walford and Miller's (1991) study of the first City Technology College, where their findings were used to inform other schools 'not so far advanced' (Walford 2008, p. 18-19). Another suggestion is to look at the *unusual case*. Michell (1983) argues that the idiosyncrasy of these cases can challenge generalised understandings.

In the choosing of the site for this project, practical and intellectual criteria came hand in hand. In theory I could have conducted the study in any school in Wales, but I needed to narrow the options in a coherent and sensible way. My first decision was to study an English-medium school as I do not speak Welsh. Secondly, in terms of special needs, I felt it needed to be a mainstream school, as including special needs schools would add considerations that were beyond the scope of this project. Being the first ethnography about the DCF, it seems reasonable to focus on the mainstream, further studies can attend to other variations. My third decision was that it would be in primary and not secondary education as I was interested in formulations of digital competence at the most basic level.

And fourthly, it needed to be a school I could travel to by train or car without having to spend the night; extra funding would have been required otherwise. However, and despite these attempts to narrow my options, I was still required to choose one school among hundreds.

In mid-September 2019, I arranged to meet the director of the regional consortium to which I was local. What struck me from our first and only conversation were his reservations regarding the idea of studying schools' "implementation" of the DCF. It seemed somehow problematic to him, and he argued that it was likely that many had not even started integrating the framework into their teachings. So, he came up with three schools he thought would feel more confident and less anxious about having a researcher around observing their DCF-related practices. One of the schools that he suggested (hereafter referred to as "the school") was characterised as the ideal case because of their involvement within the policy formulation, design, and implementation. This school had a very involved digital leadership that anticipated the needs of technological integration, training, organisational changes, and was pioneering digital teaching in their area[24]. The school also had the adequate resources and infrastructure to enact the requirements of the curriculum.

The logic for choosing this school was simple: from the hundreds of potential sites, this school was most likely to offer the possibility of observing actual DCF-related activities, and also most likely to grant me access to the field. It seemed reasonable to assume that if I wanted to see how the DCF was supposed to be working in practice, this school would be an excellent site. This decision, however, did not come without potential methodological problems. On the one hand, there was the question of whether the school was really the pioneering school in their everyday classroom practices, or it just happened to have been labelled that way due to the headteacher's own individual efforts. On the other hand, there were potential issues of generalisation and representation. In this sense, of course, this 'cutting-edge site' would hardly represent the rest of the Welsh primary

[24] The use of the term 'pioneer' is used in this thesis because this was a term use by the Welsh Government to refer to leading digital schools and practitioners. Thus, it is not related to the connotation associated to terms such as 'settlers' and 'colonisers'.

schools' experience. But the opportunity presented as potentially the closest I could get to observe how the DCF was intended to be used. Given this, a single case fulfils its purpose of being good-enough.

Negotiating formal and practical access to the school

As argued at the beginning of the previous section, access is often seen as one of the most problematic aspects of conducting ethnography. Fortunately, the school I chose to conduct my research was very receptive to my project. Access, however, is a part of the ongoing and reflective approach to an ethics of practice – and not something that is uniquely negotiated at the beginning of the fieldwork. Relationships in the field are fragile in the sense that they can suddenly change as a consequence of a variety of events, from the most mundane (such as not showing the adequate deference to a particular actor in your field, like a gatekeeper) to the most extraordinary (such as a global pandemic). This section describes the negotiation of access to the classroom throughout the study.

In the most literal sense of the word, 'access' to the school's building is guarded by the reception. Doors are controlled remotely, and CCTV watched. When accessing you have to state your motive. The first time, for me it was meeting Mrs Jones, the school's Digital Lead Practitioner (the person in charge of coordinating DCF related activities). The receptionist was already aware of that. I signed in via a registration book, and they gave me a pass that said "visitor". After being introduced to Mrs Jones she escorted me through the building and took me to a room. It contained some Desktop Mac computers, a LG TV, and a table where some Lego objects were displayed. I later learned this was called the Tech Tent and would be the room where Year 6 would do their "techier" – in Mrs Jones terms – activities during and after class (such as the Lego club).

In this first meeting with Mrs Jones, we chatted casually and friendly. She asked me if I was Spanish and told me about a project they have had with a school in Spain and Italy for the past four years. She talked about it enthusiastically; as a very positive thing in terms of "getting the children around and making new friends from other cultures". She also mentioned how lucky she thought they were in Wales, having it all funded, books, pens,

and lunches. When I took my notepad out, she shifted the conversation to the point of the meeting, the project. "How do you want to do it?" she asked. I explained the flexibility of my approach, and eventually we agreed the school will come up with whom and how I would be observing: we landed on two to three teachers from Year 4 to Year 6, during the second half of the Autumn term. We also agreed that at any point through the observations we would take opportunities to evaluate how everything was going on; meaning that they could cut it off if they wanted. Once we had agreed upon these details, we then agree I would come back another day to meet the teachers that were happy for me to observe their lessons and I would arrange with them the next steps.

It was a week after that I met Mrs Davies, Miss Floyd, and Miss Hughes – Year 4, 5, and 6, respectively. I explained to them the focus of the research as being on the teaching practices, the use of language, and the kinds of objects used, especially during the delivery of activity instructions. I explained the methods of data collection (fieldnotes, videos, and audio), and my flexibility in the use of them – meaning that if they were not comfortable with the video or audio recording, I would abstain from using them. Equally, if they wanted me to erase an incident I had recorded, I would do so. I also presented them with an idea of what I hoped to accomplish with this study; to produce textual information about real case scenarios in which the DCF was translated into lessons and classroom activities. We agreed I would schedule the observations for the whole half term and share the plan with them so they could suggest any changes. They would also receive a reminder via email a week in advance to provide them with a second chance to make modifications or to cancel. They also agreed they would read the *Teachers' Information Sheet* and sign an *Informed Consent Form* if they were happy with it, and they would distribute a *Parents/Carers' Information Sheet* among their pupils with an *Opt-out Consent Form*[25]. We also negotiated how I was going to be referred to, landing on Miss Jimenez, and I inquired about what kind of clothing would be most appropriate. Mrs Davies joked about once bringing high-heels and a kid asking her why she was wearing the "pub-shoes" in the school. I assumed this anecdote was a hinting into what counts as school-appropriate clothing. Miss Floyd recommended trousers as many of the activities would be done on

[25] See Appendixes 3 and 4.

the floor, thus suggesting a practical take on the selection of outfit for participating in the classroom activities.

A couple of weeks later and after a few email exchanges, the fieldwork started. Every day of fieldwork, I would arrive to the school and greet the receptionist, collect the camera's tripod from the storage room, get to the classroom – or the staff room if I was early. I would greet the teacher and consult whether they were comfortable with using the camera and the audio recorder. Over time this became a familiar and seamless routine. Normalising and blending into the everyday life of the school was sped up by the school being used to having people around. They regularly organised workshops for teachers from other schools. Usually after the workshops they invited attendees to have a look around the school. On different occasions I observed strangers entering the classrooms, walking, and looking around, occasionally interacting with the pupils or the teacher. The teachers would often confess they had no idea who these people were. It seems to me that at the beginning of my engagement with the field, school staff and pupils – others than the ones that already knew me – must have thought I was one of these strangers. As I became a regular in the school, its corridors, and the staff room, I started to be regarded as a quasi-member. In fact, many came to assume I was a LSA (Learning Support Assistant) doing my practices there. This was perhaps explained by the fact that when they would ask, I said I was at the school "to study teaching practices". Becoming a part of the school furniture allowed me to create opportunities to build rapport 'off-record'. For example, while having lunch with my teachers in the staff room or accompanying them to watch the children during the break time in the play yard.

A frequent topic of conversation was to compare schools in Wales, Spain, and Venezuela, or to share our teaching experiences (me as a seminar tutor in my department). During first encounters I was frequently asked directly about my origins, which provided a smoother start of conversations. My ethnic features, accent, and mannerisms makes it impossible for me to conceal my foreignness in a Welsh context. Fortunately, people often found this interesting. Moreover, my first language being Spanish was often a point of advantage. Spanish seems to have recently become a favourite language to learn in Welsh schools, and it was often a selling point to exploit. "If you like, I could give a small

talk about where I am from and teach them some Spanish expressions?", I offer the teachers. This offer was well received and helped to build a relationship with the pupils, who would often approach me to ask how to say something in Spanish or to ask me to tell them some story about where I was from. To offer something in return to 'my participants' seemed appropriate when I was asking them to allow me into their everyday life. This sort of trade-off helped the fieldwork run smoothly and it also translated into giving a hand when required, e.g., closing the blinds for the teacher, helping with technical issues such as sorting out the Bluetooth connection and so on.

The school context – a brief overview

The train journey to the school took me every time through a mixed scenery, from urban Cardiff city centre to the neighbourhoods on the outskirts, pastures for cows and, every now and again, a rugby field. Sometimes, if it had rained, as it is often the case in Wales, there were big puddles, like black pools, instead of fields. The commuting time would often vary, and I soon came to learn about the unreliability of South Wales train services. The closest train stop to the school did not have any barriers, nor a cafe nor a vending machine. The train station was bare, and with nothing to protect commuters from the weather, waiting for the train to arrive during this cold Autumn, felt like an endurance test. To leave the station I had to go through an unfinished tunnel as the crossing bridge was permanently closed. The school was a five-minute walk from the station, on top of a steep hill, in a Victorian building, in front of the local Victorian Park, and behind, the south coast of Wales.

Attached to the main building there is a smaller one, where the Nursery and Foundation Phase are located. The building is unmistakably an institutional site, a primary school. On the outside, the colour blue highlights the new metallic additions to an old-fashioned stone building: a blue electric gate, a blue fence that clearly delineates the limits of the play yard, and blue doors to the access the insides of the building. Inside, all the things that make this building unmistakably a school, are also present. Blue and white dominate the rooms and corridors. There are recycling stations by each door, Ikea-like grey sofas with yellow cushions, storage units, and at each end of the corridors two big windows. On

the walls, the products of the classes' Inquiry Base Learning projects, paintings, and motivational messages. Some of them displayed on cork boards, others directly on the wall. There are also big cut out lollipops and other figures, and hanging from the white office ceiling, big cardboard models of birds.

Despite some specific differences, there is something about the standardisation of institutional material arrangements that make them unmistakably recognisable as such. Inside the rooms, there is something about the aesthetic, the colours, the size of the tables, the distribution of the furniture, and the kind of objects in sight make these rooms look like a primary school classroom. Despite the particularities of the teacher's personal arrangements and distribution of the classroom – a particular chair, a teddy bear, a classic guitar, and so on – they all possessed similar spaces, material objects, and array of colours. There are easy-to-clean tables, suspended ceiling grids with fitted LED lamps, a portrait of each pupil, and educational themed posters. Among other things there is also a LG TV screen. Every class has a projector connected to the teachers' laptop via Bluetooth. Every projector faces a white wall painted with a special paint that creates a dry erase writeable whiteboard finish. Teachers are able to project their laptop screen onto these walls, whilst being able to write and doodle on them. Mrs Jones regarded them as a cheaper and less complicated option than smart whiteboards.

The classrooms also include a reading space with bookshelves and a sofa or two with some cushions, storage units for the children's personal items and others for their learning materials, a sink surrounded by numerous water bottles, cork boards on the walls, and at least two different sets of tables and chairs – one against the walls, for independent learning activities, and another placed at the centre of the room for the teacher-focused group. Each classroom contained seven Lenovo Chromebooks[26] and six iPads. These are stored in racks or boxes, and their respective chargers in a different box. Pupils are not allowed to take computers outside the classroom without the teacher's permission. There

[26] A Chromebook is a device which runs Google's Chrome operating system instead of Windows or MacOS. The Welsh Government has strongly recommended schools to use these because they can be enrolled and managed via the hwbcymru.net domain, allowing users to sign directly into the Chromebooks with Hwb credentials (meaning they are signed into the browser and Hwb applications immediately).

is a daily tech-check list to keep track of the devices. Moreover, although the school can provide the teacher with a laptop, they are encouraged to bring their own computers. Most of them possess MacBooks as the school offers an Apple Finance Scheme for three years, although not without high interest rates – as some commented. Notably there is the absence of the teachers' desk. Often teachers use a shelved unit by the whiteboard or by the TV screen as some sort of improvised desk.

In total, the school has around five-hundred students spread across fourteen classes and four nursery classes. In Key Stage 2, each year has two classes and each class around thirty pupils. There is one teacher per class, who is often helped by one or more Teaching Assistants (TA) and, if necessary, also one or more Learning Support Assistants (LSA) for specific children. There are also TAs with particular tasks, such as developing the "collective worship", organising the art studio, gardening time, or the baking sessions. There is also an LSA in the Foundation Phase, whose responsibilities go beyond their official role and has earned the title of school's technician. They get called upon when the teacher is not able to solve issues dealing with digital technology in the classroom.

The classes are often divided into three or four groups. The groups are organised according to the learning level of the children, depending on the activity. Each group is assigned a different practical activity, and the groups rotate so they all do each activity once. This is called the *carousel*. The teacher watches and facilitates the overall aim of the activities, and the TAs usually have a group for themselves. There is always at least one group engaging in independent learning activities. Activities are organised around a main topic, which dominates through a whole half term. The topic of the enquiry is often negotiated between pupils and teachers and is meant to be studied across several subjects. Breaking the class down into smaller groups and organising them according to the learning abilities means that teachers can anticipate which groups are prone to require more attention and support, and which can complete the activities more independently. This means that sometimes activities vary depending on the group. In these circumstances, teachers face the task of designing varied ways of meeting the learning objectives. This is particularly obvious for some pupils individually. For example, Miss

Floyd, the Year 5 teacher, once explained to me that she let Oliver, a child diagnosed with autism, write a report about any topic he wanted instead of about the class IBL topic:

> "So, Oliver –you know, Oli– we did a report on Fairtrade, Oliver won't do it because of his condition. If it is not of interest to him, he won't do it. So, he did it about Dinosaurs and it's really good. I'm gonna show it to you. It has the introduction, it has ... he met the skills in his own way" – [Transcript extract 1]

Mrs Jones explained that many of their pupils come from deprived families, and most have some kind of struggle at home. By instruction of the teachers, I learn to see the signs of the pupils' home situations. Some of them were material – e.g., children with worn-out clothes or simply not adequately dressed for the cold weather and shoes without laces – and others were psychological. One of the first bits of advice that I received was to watch out for children with "attachment issues", to manage the situation sensibly by creating and maintaining boundaries.

When I started my fieldwork, I was not aware of the reputation of the town in which the school is located. Soon I learned that – although there is, and there has been for a while, the perception that it is an up-and-coming area – the town has faced various problems encountered by post-industrial spaces. Indeed, as many communities in Wales, the town was affected by the privatisation and reduction of the steel work industry during the 1970s, which impacted the economy of the whole community and from which recovery has been a rather slow process. The pupils of the school reflected the demography of the town; mostly, low-income white British. The last school inspection (Estyn 2017) report stated that around 36% of the pupils were eligible for free school meals, which is well above the average for Wales (19%), and that some pupils were in the care of the local authority. The report also stated that, although no pupils have a formal statement of special needs, the school identifies 31% of pupils having additional learning needs, which, again, is above the national average (21%).

At the same time, the school contained cutting edge technology, resources and knowledge that placed the school as an ideal candidate for pioneering digital education. This has been achieved in no small measure through the work of its Headteacher, Mrs Rose, and

its Senior Digital Lead, Mrs Jones. In the early 2000s, the school, as it was convention, had one IT-suite, and classes would use it once every two weeks. Often the computers could not be used due to technical issues, but everything changed when Mrs Rose joined the school in 2011. Mrs Jones described this as the moment when everything properly started. The summer before taking the position Mrs Rose already had pushed for installing Wi-fi at the school. At the time, some teachers worried about the effects of the Wi-fi on children and showed some resistance. But Mrs Rose pushed for a technological, pedagogical, and administrative change. For example, she bought some iPads for the teachers to take the registers. While before they would take them on paper and then someone would insert the data into a computer, now they were made electronically in the moment, which facilitated teachers' work[27]. Mrs Rose also equipped, first the juniors and then the rest of the classes, with computers and started asking the teachers to think of ways of using the computers as part of the everyday teaching. Around 2013, Mrs Rose had introduced five iPads to the juniors, and over the years this was the case for the other classes too. Now each class has seven Chrome Books, six iPads and access to a few Desktop Macs.

The current approach is that to teach IT skills, teachers do not need a whole lesson but to integrate it as part of the lesson on other topics. For example, during a session where pupils are learning about zoos they can implement and practice digital skills through the activity of researching online about the topic using a computer. The shift from *class-teaching* to a *group-teaching* focus was a key pedagogical strategy in this new approach. Mrs Jones explained that having one device per children is not necessary if they work through a group-focused dynamic (e.g., using the carousel system).

Arriving to the point they had reached in 2019 (when I conducted this fieldwork) did not come without challenge. "To make teachers confident to use digital technology in their teaching practices, a lot of professional development was required", Mrs Jones

[27] Until recently they had been using two tracking software packages (one called Classroom Monitor and other called Inset) but Building Blocks (developed by the Learning Partnership - https://tlpwales.co.uk/) unified them and "made it more practical" and in alignment with the new curriculum ethos and expectation, said Mrs Jones. By the time of the fieldwork, teachers were using Building Blocks as part of their planning and evaluation sessions.

commented to me during one fieldwork visit. These challenges and resistances, Mrs Jones reflected, are found not just in this school, but across Wales. This is not surprising when we consider that conducting a lesson and managing a class is such an achievement, that any imposed change that challenges the already-known strategies to accomplish this, can reasonably be seen as threatening.

Some methodological reflections on the issue of context

The study of the 'local' – the case 'in context', the Malinowski's 'imponderabilia of actual life' (1984 [1922]) – was a general mark of the qualitative turn from which interactionism but also ethnomethodology emerged. And although *context* can refer to many things, it is fundamentally and routinely used to repair of the indexicality of the analyst's claims. We call this the act of contextualising the study, i.e., in relation to *what* are the researcher's claims. This work of contextualising helps the reader frame and, thus, assess the descriptions and arguments that constitute the ethnographic text. In this sense, context facilitates a frame of reference.

At the early stages of the research, thinking about context also helps the researcher find where and how to conduct fieldwork. In this sense, *setting* is a named context in which phenomena occur, and a *case* is those phenomena seen from a particular angle (Hammersley and Atkinson 2007). Commonly, for the fieldworker, settings and cases are not considered to be natural occurring phenomena in a positivist sense, as pre-existing locales, and objects with clear cut boundaries. Similarly, *field* is the inevitable methodological conceptualisation yielding from the ongoing redefinition and negotiation of the setting under investigation – 'the "fields" of fieldwork are themselves worked at and are produced through such work' (Atkinson 2015, p. 4). The active production of these conceptually different elements (context, settings, field, cases, and so on) highlights the criterion for definition as not geographical but analytical; it has to do with what it is the researcher is trying to find out about the social world. The orientation I take towards the construction of context, setting, and case will be further discussed in the third section of this chapter, after having described in more detail what the fieldwork consisted of in the next pages.

2. Observing and recording methods

The chapters that constitute the corpus of the analysis and discussion (Chapter 4, 5, 6, and 7) are grounded in observations produced during the ethnographic fieldwork I am about to describe. The fieldwork consisted of a total of six months engagement with different fields of various nature. The main one being *the school*, which I visited for the duration of a half term. I also attended a variety of workshops and activities organised by different schools and stakeholders carried out in different sites across South Wales. Consequently, the field site is considered mobile multi-sited, and polymorphous. In the following sections, I describe the observational work I undertook as part of this fieldwork, and the methods I implemented to record events and activities throughout.

Participant observations

My observations were programmed in compliance with the school's timetable, which in turn was organised around a few features. One of them being the lunch breaks, which would divide the day into two main lots: a morning and an afternoon session. From the beginning of November until the Christmas break 2019, I attended almost every day of the week to the school. Sometimes I would be there the whole day, sometimes just for one of the sessions. This gave me a total of thirty observations, equally distributed among the three teachers.

The sessions usually consisted of a main section structured by a carousel of three activities: a teacher-focused activity (mainly focusing on literacy or numeracy), an TA/LSA-focus activity (which would vary, sometimes being art or craft, gardening time, reading, etc.), and an independent learning activity (which usually would involve the use of computer devices). The carousel was often precluded by some shorter activity such as Welsh, phonetics, or collective worshipping, interrupted by a 15 minutes "active break", and closed with a warming down activity such as reading, watching a video, or singing.

If the train was not delayed or cancelled, I would arrive before the classes started and I would observe teachers prepare the classroom before the pupils arrive. For example, turning on the lights and screens, setting up the projector, distributing the tables in a

certain way, and leaving the pupils' books out on the tables. This was usually a strategy to control who would sit together on the same table. The teacher would also set out laptops or iPads, rulers, or rubbers, printed instructions, assessment criteria, or bits of the pupils' previous work, pencils, glue, or anything pupils might need to accomplish the activity. This preparation could take place early in the morning, before the pupils even arrived at the school, or during the breaks. In fact, one of the first things I noticed, is the amount of invisible work that goes into accomplishing classroom activities. Teachers often arrive at the classroom much earlier than the start of the activities and leave much later, and during and in between classroom activities they would do a great deal of *articulation work* (Leigh-Star and Strauss 1999)[28].

I was interested in understanding the functioning of the everyday school, the conditions in which the teachers worked, everything that would help me make (adequate) sense of the events and the people I observed. Therefore, although the focus of my analysis, and consequently the focus of my observations, was the sessions in which the DCF could be seen as being enacted, I tried to spend as much time at the school as possible. Often schools have been treated as sites that are "too familiar" to the ethnographer. However, for me the main concern was whether I could single out events, not because of too much familiarity, but because I was not familiar enough to recognise them when I was confronted with them. How I addressed this issue of familiarity (or apparent lack of) is discussed in more detail in the last third of this chapter. For now, however, my intention is to express the motivations behind the way I conducted my observations.

Participant observation was not only aimed at collecting data in a formal sense, but as a way of learning about a world that was unfamiliar to me; a way of building understanding of the school as to, first of all, succeed in developing ways of navigating it competently. It has been argued that participant observation is, nothing more and nothing less than a way

[28] This is a term developed in the field of CSCW (Computer Supported Cooperative Work) to refer to the work that gets things back 'on track' when the unexpected but inevitable contingencies of cooperative work emerge (Leigh-Star and Strauss 1999, p. 10). It is work that is invisible and often not included in rationalised models of work. For this reason, I believe it can be used to describe much of the work teacher do *off the clock*. In a way, they are the *invisible technicians* (Shapin 1989) of their own work.

people have to learn about the world. It is a *method* used by *everyone* (not just ethnographers) to acquire knowledge about the social world, 'in the course of participating in it' (Hammersley and Atkinson 2007, p. 98).

> 'It is through such participation, in the most general sense, that we, as ordinary men and women, can ever learn anything. We become enculturated – whether it be on our own culture or a strange one – through participation in a social world' (Atkinson 2015, p. 39).

Thus, in ethnographic observation, *observation* cannot be interpreted literally. Observation necessarily involves a degree of participation – even when the ethnographer is said to be conducting non-participant observation (Atkinson 2015). It does not consist of just passively watching something unfold, it requires full or partial sensorial and cognitive engagement with what is made situationally and locally relevant by those present on the scene. It is embodied as much as cognitive. In this sense, much of the theories of knowledge discussed in the literature review can apply to understand the way ethnographers learn about the social worlds they aim to describe.

Essential for participant observation is our capacity to understand the world from a perspective other than our own, however flawed. Ethnographers routinely make use of this potential to gain insights into the lived details of other's everyday lives. The premise, as I understand it, is that all human beings share enough in common as to communicate and understand each other at some level because we share a corpus of practical methods of knowing[29]. Atkinson (2015) suggests that the rationale of field research rests on the hope of reaching a level of *homology* between the participant and the ethnographer. Goffman (1989) depicts it as *tuning* yourself into the life experience of those you aim to study. It is in this condition of being tuned-in or homologous that we can pick up, 'not as an interviewer, not as a listener, but as a witness to how [participants] react to what gets done to and around them' (Goffman 1989, p. 126).

[29] The principles of a theoretical discussion about this issue can be found in interactionist contributions deriving from George Mead and Charles Cooley's work, and also the phenomenology of Alfred Schütz as discussed in the literature review.

This idea of tuning in, as characterised by Goffman, brings up a series of methodological issues to the surface. Firstly, being adequately tuned in is important to recognise the phenomena we witness as ethnographers in the field. Secondly, it highlights the difference between hearing accounts of what happens and witnessing with your own eyes the events you ought to describe. This distinction invokes again the importance of participant observation as the quintessential methodological strategy in ethnographic research. Finally, but intertwined with the previous points, is the emphasis on the observability and therefore *witnessability* of social phenomena. Here, recruiting ethnomethodological ideas help this project align the phenomenon with the possibility of its study. This point is further addressed when discussing the analytical framings of this project.

Further fieldwork

After a conversation with a DCF Policy Lead at the Welsh Government in early 2019, I was granted a Hwb account. The Hwb is an online network that uses the Cronfa System to function as a digital platform for all teachers and learners in Wales. The Hwb is the result of a series of exchanges between government, practitioners, academics, and industry, and its aim is to make digitally available several teaching resources, tools, and software. It offers all educational practitioners and learners in Wales access to a variety of educational resources (e.g., Google for Education, Microsoft 365, Encyclopaedia Britannica, Just2Easy, among others). I was assigned a teacher-type account, but without association to any real school. I chose this option over a government officer-type (which were the two options offered) because I wanted to explore the platform from a teacher's perspective.

To make my status clear to any who inquired into my profile, I filled it with information that presented myself as a PhD student at Cardiff University interested in the DCF and someone looking forward to establishing contact with any school that would like to show me how they enact the DCF in their lessons. I use the Hwb to observe the everyday doings of teachers on the platform. As I was interested in building an understanding of the DCF from the teacher's perspective, I found the Calendar feature of most use. There I had access to information about DCF-related workshops and events to which I could sign up

and potentially attend. For example, a workshop in which a school's Digital Lead Practitioner would organise a presentation about a particular feature of the DCF (e.g., digital citizenship, computational things, collaborating and producing, and so on) for teachers from other schools. The Hwb's Calendar allowed me to organise a series of fieldwork days in different sites for 6 months[30]. It allowed me to, in a way, follow the phenomenon (DCF-related teachers' workshop) around moments of face-to-face encounters at different moments in time, in particular geographical locations. Moreover, these encounters would often produce an online teacher network that would sustain contact among the teachers that had attended the workshop through time by using apps such as Teams, and Google Class. In this sense, the ethnographic site can be seen as *multi-sited* (Marcus 1995; Boccagni 2020) and online and offline (Pink 2015; Hine 2015).

Recording classrooms' activities

Considering participant observation as the heart of, not only ethnography, but also sociability, the ethnographer as a member is the first and foremost recording device. We record through sensorial perception, cognitive processes, memory, and the producing of fieldnotes and other types of material and digital records. For this project I also heavily relied on a video camera and an audio recorder as recording devices. The level of detail that fieldnotes and video recording allow to reconstruct and represent granted a different kind of analytic work (Watson 2018). The methods were chosen for their adequacy to address the logic of the inquiry, to record *readable instructions* of the organisation of social phenomena (Garkinfel 2002). As stated at the beginning of this chapter, one of the aims of this study is to produce faithful representations of the actual processes that constitute the practical, local, sequential, and situated construction of digital *knowledge*, *skill*, and *competency* in classroom interaction. To this end, a detailed and meticulous attention to naturally occurring actions and interactions in the everyday life of the

[30] My last day of observations was the Regional Digital Learning event in March 2020, just before the Covid19 first lock down.

classroom was required. To produce such an account, I combined the use of fieldnotes with audio and video recordings.

Fieldnotes constituted a preliminary textual reconstructions of the school everyday life and in particular the everyday life in the classroom. During the session, I tried to write down to the best of my abilities all that my eyes and mind were registering as relevant to the task of understanding the school's everyday functioning and the classroom's dynamics. I got to fill four A6 Pukka pads of 200 pages with cryptic notes, some more articulated descriptions, ideas, and sketches; a mix of English and Spanish, depending on what allowed me to put words down quicker. Every evening, I would digitalise these fieldworks by typing them into a Word Document (with pictures attached if it was the case) and, in the process of doing so, I would also expand descriptions and ideas, which in turn involved some kind of preliminary analysis. Descriptions of events and these preliminary analyses would be differentiated by colour coding. Throughout the fieldwork it became more frequent to make fieldnotes as instructions on how to locate relevant moments in the audio or video recordings; to indicate to myself what to look for when revisiting the recordings. For example, moments seen as requiring a more detailed description than what I was able to produce *in situ* were logged in the fieldnotes and later found in the video and audio files. This is particularly useful for a second-language English speaker, where mastery of the language is often a source of anxiety.

The audio and the video recordings were produced during the classroom observations, giving me over sixty hours of video and audio recordings. Devices were turned *on* when the class started and turned *off* when it ended. They did not record anything that occurred outside the classroom (e.g., other classrooms, corridors, staff room, or play yards). The audio records were produced by a personal digital voice recorder, an Olympus WS-650S, of simple functions and easy portability. The voice recorder was attached to a lanyard that would hang from the teacher's neck and wired to a lapel microphone clipped to the lanyard. Battery levels would have to be regularly monitored to avoid the recording stopping in the middle of a lesson.

The camera, a Panasonic SDR-H85 loaned from the University (alongside a robust a tripod that, luckily, I could leave in the school storage room), was also only used to record

classroom interactions. I would install the fixed camera in a convenient place a few minutes before each class. Usually, this was a corner of the classroom, on top of a piece of furniture, away from children's reach and with the best angle I could find to frame the setting in which lessons would unfold. The fix position of the camera, despite the possibility of this rearrangement, meant that certain actions and angles of vision were out of recording range. Because it was an old camera, batteries had to be recharged before and after each class (e.g., at home or in the classrooms during the classroom breaks).

Every day, after leaving the field, the devices were taken to the University, for the files to be downloaded on the university's network, to avoid filling the devices' memory. Audio records were downloaded as mp3 files labaled with date and located in a folder with a Word version of the correspondent transcribed fieldnotes and the mp4 video file. Occasionally, I also took pictures of classroom resources such as timetables, Inquiry's descriptions, carousel plannings, and so on, which were stored and archived along with the videos and audio files in the University's computer network.

The use of video cameras and audio recorders has a long tradition in ethnographic research, ethnomethodological research, and particularly in conversation and discourse analysis[31]. However, instead of reviewing this literature, I want to dedicate a few lines to reflect on what I think the camera can tell us about the ethnographer's gaze and the production of fieldnotes. One may argue that video recordings, as well as fieldnotes, are a representation of the ethnographer's gaze. They are conditioned by the researcher's decisions over angle, frame, focus, and duration. As with fieldnotes, 'video and audio recording are records and not the phenomena' (Green and Stewart 2012, p. 71). Videos are, in this sense, constructed representations (Baker *et al.* 2008). Fieldnotes and videos also hold in common their function for the ethnographer. For example, fieldnotes transform passing events 'which exist only in its own moment of occurrence, into an account, which exist in its inscriptions and can be reconsulted' (Geertz 1973, p. 19).

[31] This dates to the early 1970s (see for example Cicourel *et al.* 1974; McHoul 1978; Mehan 1979; among others). Recent contributions include various chapters in Delamont's (2012) *Handbook of Qualitative Research in Education*, Mair *et al.* (2012), vom Lehn and Heath (2016), Watson (2018), and Mclvenny 2020), among many others.

Equally, videos function as a 'extrasomatic "memory" that allow researchers to examine materials extensively and repeatedly' (Mehan 1979, p. 16).

However, during the fieldwork conducted for this study, what the camera *captured* was not what my fieldnotes recorded. If I had only relied on one or the other, my thesis would be very different. Mehan (1979, p. 16) argues that videotapes are 'helpful in field research because they preserve research materials close to their original form' and there is an extent to which I agree with this statement. Not because videos are objective captures of reality (Bateson and Mead 1977), but because *objectivity* in ethnography – or anywhere for that matter – is an illusion (Walford 1991). However, because videos have the potential to make visually available representations – albeit *always* partial – of natural occurring scenes and events, the intelligibility of what it records is not yet constrained by the contingency of a *languaged* description. Videos represent data in a *rawer* state of interpretation. As Macbeth puts it:

> 'As a matter of faithfulness to the texture, temporal shape and material detail of the scenes they record, the video of filmic record provides remarkably uninterpreted renderings of the field' (Macbeth 1990, p. 191).

As with audio recordings, videos reproduce the orderliness of the events they document (Mondada 2003). Consequently, they are an appropriate recording device for the ethnographer interested in detailing the orderliness of everyday life. Nevertheless, in order to make sense of what happens in a video two conditions are necessary. First, the video must have *good-enough* quality, and second, the analyst must possess at least *vulgar competency* to the setting (Garfinkel and Wieder 1992). Analysing what happens in a classroom interaction is often made easier because schooling is a highly institutionalised process, and primary school classrooms are a familiar site for most. However, participant observation in the setting is still essential in order to acquire the endogenous *interpretative competency* (Cicourel 1971) required to recognise, account, and appropriately analyse the constitutive details of what was recorded.

To re-emphasise my point, video recordings – and this extends to audio recordings too – allow for particular forms of ethnographic work. For this project, they enabled particular

ways of systematically analysing patterns and practices when fieldwork was no longer possible due to the closure of schools and the suspension of all face-to-face research during the Covid-19 pandemic (March 2020 onwards). Videos and audios made it possible to reconsult the work done among members in the classrooms, and to examine how this work got done and done in such recognisable way (Baker *et al.* 2009). So, it was the case, that I discovered much of the relevant details that help me make sense of the scene by watching, re-watching, stopping, and slowing down the videos. Synchronising the videos and the audios and sometimes complementing the audios from the recorder (tagged to the teacher) and the audios of the camera (usually capturing some of the children's chat in the background). Making sense of the videos and audios, however, necessitated the previous ethnographic fieldwork I undertook. By just watching the video and audio recording, without developing much of the vulgar competency that Garfinkel and Wieder (1992) talked about, many of the phenomena that occurred in the classrooms would have remained invisible to me. To produce a competent reporting of the events recorded relied on enacting the *participant* part of participant observation. It was not just about the sensorial capacity to observe an event, but by virtue of *being there*, to be able to draw on a stock of knowledge that had been cultivated throughout the fieldwork.

Recording teachers' workshops

In contrast with the recoding methods used for the classroom observations, the analysis of these teacher-to-teacher encounters mostly relied on fieldnotes produced *in situ*. For the first period of the fieldwork, fieldnotes were taken by hand, and written in notebooks, then transcribed into digital files and expanded based on fresh memory. Later, analogue writing was substituted by a digital one. After the acquisition of an iPad, notes were typed (when seated listening to a teacher's presentation) or hand-written using the Apple Pencil (when walking around or in the middle of an activity). The process followed in a similar way to that described in the section above; brief essential notes taken and later expanded during (adding information from software, apps or websites that had been made relevant in the workshops). I attended a total of eight workshops throughout six months.

In a way these observations function to identify a sort of second layered phenomenon. In these workshops, teachers (workshops organisers as well as attendees) were producing accounts of their practices when sharing their experiences of enacting the DCF in their own classrooms, ways in which they make sense of the DCF in their practice, and mostly the challenges they encounter. These were accounts produced by teachers in conversation with their peers, and they informed my own understanding of what is involved in the process of integrating the DCF into a school's curriculum from teachers' perspectives.

Fieldwork disruption – the impact of the pandemic

Originally, I had planned an academic year of immersive fieldwork. However, the spread of Covid-19 and subsequently, the lockdown measures translated into the sudden closing of schools and suspension of all face-to-face research when I was only a few months into the fieldwork. The uncertainty and unpredictability about *when* and under *which conditions* schools would reopen forced me to reorient my activities and to adapt the project to the new circumstances. There was an attempt to follow the way the pandemic made digital technologies even more relevant for maintaining some kind of education through a shift to *emergency remote teaching*. However, the teachers I had been in contact with expressed a high level of distress with their situation. Under these circumstances, I judged that imposing the pressures of research onto them was not sensible nor ethical.

Therefore, adapting the project meant changing the scope of the project and rebalancing the arrangements of the depth and breadth previously considered. Although I had only conducted two months of fieldwork in one of the schools, fortunately, I had video and audio-recorded the lessons I attended – the product of which was over sixty hours of recording of everyday classroom life. Originally, these recordings were meant to supplement and check my observations – as a non-native English speaker, I was concerned I would miss out or not understand the language at times. As the fieldwork advanced, the camera and audio-recorder became the main recording devices, and ethnographic fieldnotes started to supplement the recording and analysis of the videos

and audios. Shifting the analytic lens to those recordings and their affordances allowed for a different level of detail, richness, and depth.

The disruption of the fieldwork encouraged me to try to get the most out of the recordings, not in the sense of indiscriminate amounts of detail, but to make best use of the affordances video and audio recording allowed as I have discussed in the previous section. For a project that was already turning the analytic lens towards the *granular* (Atkinson 2017) and *lived detail* (Garfinkel 2002) of social settings, practices, and actions, the scope brought the reformulation of a logic of inquiry, making it much more focused on the moment-by-moment achievement of the teaching practices. Thus, what was originally designed to be a more traditional ethnographic project, became something closer to what Atkinson (2015) refers to as *an aliquot* of ethnography. In other words, a brief but intense ethnographic engagement that enables enough exposure to write meaningfully, as long as limitations are acknowledged.

Ethical considerations

Regarding ethics there were a series of measures I took to make sure this project was up to the adequate standards of practice so that fieldwork could run as smoothly as possible. Firstly, I got an Enhanced DBS (Disclosure and Barring Service) check, ready to share with schools, and I got an Ethical Approval from the Cardiff University Ethics Committee. My approach to this research, when it came to ethics, was based on the realisation that it is the ethnographer who is an actual participant, since it is they who seek to participate in the lifeworlds of the people they study. Taking over the category of 'participant' has ethical implications for the way ethnographers conduct themselves in the field and after. Since it was me who was participating in the school's everyday life, it was my responsibility to do what I could to be transparent about my intentions. I gave written information, but also kept open the possibility of a conversation about it at any time. I also tried to stay mindful regarding the needs of the individuals I encountered in the field (as illustrated when Covid-19 hit), keeping a flexible approach to the process of documenting and recording. I relied a lot on my common sense for this and in what is often defined as a feminist approach to *care* (Benhabib 1992; Tronto 1993). Nevertheless, I cannot be completely

sure I accomplished the level of rapport I aimed for, as I cannot ever know if there were issues that stayed unspoken and invisible to me. This is one of the difficult aspects of ethics in ethnographic research: one thing is what we say we would do, and another thing is whether that is perceived by all the participant in the same way.

Reckoning with the trickiness of some of these issues entails an ongoing revision of *ethics in practice*. Moreover, although it is impossible to escape some of ethical dilemmas, the researcher still needs to do their best to make practical decisions that prioritise principles of ethics in research. With this aim in mind, I took a series of measures throughout the fieldwork and after. For example, I gave each teacher the power of determining whether I would observe them or not; they decided whether they were comfortable with me observing their teaching practices and under which terms. I also gave parents and carers the opportunity to opt-out their children from the study. These decisions had a great risk, as it could have meant that observations and recordings were not possible in some of the classrooms. Luckily teachers agreed and no parents or carers opted their children out.

I also tried to have a friendly and approachable attitude to facilitate the communication of any issue regarding the fieldwork and my presence in the school, but again I was lucky that no issues emerged. With this approach I set out fieldwork to be as undisruptive to the *naturally occurring* of classroom life as possible. Participation did not require any additional work from teachers apart from occasional informal conversations on the go. If any issue occurred with the children, I followed the teachers' advice on how to deal with it. Fortunately, that was not necessary.

Another of the challenging aspects of ethics that requires careful navigation in ethnographic research is that of complying with the principle of *informed consent*. For there are practical difficulties of providing consent that is actually and fully 'informed'. More concretely, it is not usually possible to provide precise information before completing the research. Because of the reflexive nature of the research process, the aims and project descriptions naturally vary over time. To deal sensibly with this limitation I tried to provide a very broad description of the project. However, this produced some limitations as later in the writing period there were some analytical themes, I would have liked to explore, and I could not. They were not explicitly specified during the fieldwork,

and although consent from the teacher could have been sought out again, finding the pupils would have been a harder, if not impossible, task.

Additionally, getting written informed consent is complicated in scenarios where there is no control over who will be present in a scene. For example, when attending the workshops, I sent emails to all the organisers explaining who I was and why I wanted to attend these events. I explained that I was not a teacher, but that I was still interested in participating in the activities, and that, although I was going to make notes of the activities for my research about the implementation of the DCF in practice, I would not be collecting personal information about the attendees. Although they would agree to allow me to attend, I would not know until I was there who would be attending too. Usually, there would be an introductory round and teachers would state their schools, the year they taught, and perhaps something about them or their school's experience with digital technologies. On these occasions, I would take the opportunity to introduce myself, the project, and asked them if it was *ok* if I took some notes.

Further, video and audio recorders were not used to record these encounters because it was considered ethically and practically difficult, and it would potentially reduce the possibility of access to the sites. To start with, it would have required me to request informed consent beforehand – for every single event with a new organiser each time – by either requesting the lists of attendees from the organisers or asking them to distribute and collect the signed forms. On the one hand, this either would have meant asking the organisers to break GDPR, or it would have added extra work for them, potentially reducing the possibility of access to the field. On the other hand, this would potentially put off attendees, affecting their rightful access to professional learning activities. For this reason – considering that those individual teachers and other educational practitioners who might become participants was often impossible to anticipate, and the ethical implications of this – fieldnotes were considered the most suitable recording method.

Another complication in ethnographic research is that of complying with the ethical principle of *anonymity*. In this text, any identifiable data such as names, locations, specific dates, or other factors that could be used to identify participants have been removed or altered. For example, all names are pseudonyms. However, someone familiar with the

educational regional consortia, and the role of some of its most outstanding schools and practitioners may be able to put the dots together. To the questions of whether it is possible to provide absolute anonymity to a 'cutting-edge site', the answer is probably no. However, again, I am under the obligation to do all that is in my power to prevent the recognition of the school and the people I studied. This was a risk I made clear to the school when I negotiated access. Although the headteacher and the Digital Lead Practitioner were indifferent about whether the school was or was not anonymised, the teachers preferred it that way.

A final dilemma is that of representation. To address the issues that come from this dilemma, I followed Goffman's (1989) advice of taking an analytical rather than judgmental approach. In fact, although I am interested in teachers' practices, for the purpose of this thesis, I am not interested in the individuals. The analytical focus is on the practice and the classroom situation as 'perspicuous settings' (Garfinkel 2002). This topic will be discussed in more detail in the following pages, where the analytical approach to the study of social phenomena is articulated along with issues of representation.

3. Analytical framings

The following section is less straightforwardly descriptive, the details are not of practically establishing a methodology. Instead, it deals with some of the ontological, philosophical at points, aspects of how I constructed my approach to analysing a classroom setting, and in particular, pedagogical instances of digital competency. These are not practical in the same way as the previous discussions of methodology, but still have a practical impact on the way in which I handled observations, data, and the analysis of social phenomena.

Throughout the process of conducting the study, I followed Goffman's (1974) advice and when witnessing a particular classroom activity and I asked myself, what is this a case of? Can the actions and interactions I am observing be recognised as following a pattern which allows for specific basis of imputation? In other words, how to be sure that the activities I was observing and recording were relevant to the identification of the teaching and learning of digital competency? These questions led me to think critically about

methodological formulations of participant observation, reflexivity, and context by considering who an observer might be, the possibility of the observability, accountability, and recognisability of social phenomena, and where is the relevant constitutive detail of social action and interaction to be located. This section's aim is to throw some light on where this project sits regarding these issues.

Rethinking positionality

This project was the result of the combination of a series of factors. On the one hand, there was a preassigned object of investigation, the DCF. On the other, my own intellectual interests and personal circumstances. In this sense, the fact that I am not British, English is not my first language, and in sum, I can be seen as an outsider and a stranger to the culture, unfamiliar to its settings, a sort of *inverted anthropologist*, is relevant when considering positional reflexivity. If the job of the sociologist in their own culture is to make the familiar *strange* (Geer 1964; Becker 1971), and the job of the anthropologist is to make the strange *familiar* (Malinowski 1984 [1922]), by inverted anthropologist I mean the irony of coming from a far away, strange country, to study a rather mundane and familiar setting to the British ethnographer; the classroom[32]. Thus, my task seems to be to make strange what is potentially familiar to the reader of this thesis, while making familiar what is – in theory – strange to me. This raises some puzzling issues in the task of *fighting familiarity*.

The problem of familiarity in educational ethnographies has been widely reported (Geer 1964; Becker 1971; Wolcott 1981; Young 1971), and in Cardiff, Delamont and Atkinson have done much work on *fighting familiarity* (Delamont 2005; Delamont and Atkinson 1995; Delamont *et al.* 2010; Delamont 2016; Delamont and Atkinson 2021). The problem seems to be that 'because educational researchers have been pupils and

[32] It is worth mentioning that although ethnography has been strong in British sociology of education, it is less prominent in the Welsh context. The number of ethnographies taking place in Wales is small (e.g., Reynolds, 2000; Selleck, 2012). This is not because ethnography is objectively a less preferable approach to study Welsh education, but because in general British sociologists have overlooked Wales as an ethnographic site. In this sense, this project contributes to a growing number of Welsh educational ethnographies.

students, and very often teachers and lectures, it is hard to concentrate and "see" things' (Delamont 2008, p. 42). It is reasonable to assume, as Delamont does, that 'going into schools in a different country provides instant 'strangeness', but [that] in our own it is hard to force oneself to focus on what has happened rather than what one 'expects', 'knows' and is familiar with' (Delamont 2008, p. 42).

However, there is no consensus on whether the stranger's perspective is an advantage, or a disadvantage. For example, Simmel (1950) and Schütz (1944) treated the stranger observer – the outsider positioned as marginal to the culture – as a potential source of insight into taken-for-granted beliefs. Others such as Mannheim (1936) and Berger (1963) formulated positionality as an attitude; a matter of *stepping back* from unconscious engagement in cultural activity. One extreme of this precept believes that 'only an outsider can conduct valid research on a given group' (Styles 1979, p. 148), for only they *possess* the needed objectivity and emotional distance. However, it has also been argued that developing enough familiarity as to achieve the level of *homology* (Atkinson 2015) and *tuning in* (Goffman 1989) is required in order to make sense of the settings, its social order, and its endogenous culture. In this sense, Laberee (2002) talks about the danger of going *observationalist*, as the risk of missing out an important aspect of the setting and misunderstanding the behaviours observed. This was, for instance, Knorr-Cetina (1981) and Lynch's (1985) difference with Latour and Woolgar (1979) in their classics laboratory ethnographies. Whilst Latour and Woolgar opted for an observationalist approach, Knorr-Cetina and Lynch argued for the need to develop a level of competency in the setting to produce adequate descriptions of the activities observed.

Before embarking on the fieldwork, my status as an outsider was a concern to me. The anxiety lay in the possibility of a competent recognisability of social phenomena both in terms of observation and representation. I wondered whether I could produce accounts to be recognised as valid to the familiarised eye. I come from a different culture with a different educational system and a different language. Moreover, there is also a generational gap, which can be seen as relevant when considering the development of digital educational technology over the past years. I have never considered myself particularly savvy with digital technologies. However, I soon realised that this is only a

problem if we consider (i) culture to be a monolith, and (ii) if we assume rigid dichotomic categories such as outsider/insider and native/observer to be organising principles of positionality. This is when we face what has been called the *inaccessibility problem* (Sharrock and Anderson 1982). This problem follows the following logic:

> 'Given that outsiders can never be insiders and understand insiders as they understand themselves, then it is suggested that outsiders' understanding is really no understanding at all' (Sharrock and Anderson 1982, p. 123).

Or in other words, if it is indeed true that natives and ethnographers or insiders and outsiders have a different cultural map that makes them see the world differently, the ethnographer then cannot share the native's culture and see things from their point of view without becoming a native first. The thing is, however, that even though my schooling took place in a different culture, certain features remain just the same and others became easy to recognise through the development of a local interpretative competence. Perhaps this says something more universal about how classroom-specific-work gets done than I originally gave it credit for, or about the way culture, instead of pre-existing and monolithic, is ongoingly produced and accomplished. It also says something about our human capacity to adapt and develop ways of seeing and acting that make us competent participants of settings – taking competency is a notion with many situated shades. Thus, although I may not be a native, I can develop different levels of *local expertise* through participant observation. In this sense, rather than thinking about outsider/insider and ethnographer/natives, I found it more useful to think about the ethnomethodological notion of membership in relation to levels of competency. Not because *member* is an empirical category, but because it refers to the empirical organising principles by which participants themselves are *part of* and *constitute* a scene. On this basis we can say that the ethnographer does not join a scene as an outsider; instead, the ethnographer becomes a member of the setting they study, and members are already participant observers.

This, of course, depends upon our understanding of what a *setting* is and how it is constituted. In ethnomethodology, the setting – and all that is contained within it – is considered to be all the time, ongoingly achieved by the members and 'are assumed to have not existed independent of the occasion of their production' (Payne 1976, p. 33).

Members' actions ongoingly constitute the setting, the situation, the occasion, and its recognisability. In this regard, the argument is that members routinely use 'methods for making [their] activities visibly-rational-and-reportable-for-all-practical-purposes' (Garfinkel 1967, p. vii). From this point of view, fighting familiarity, advising against *going native*, or the vantage *point of view* of the stranger, are not the most relevant features of good analytical work. Instead, the strategy becomes to ground the analysis in the observability of available reflexive social action. By those terms:

> '"Context" is not some fixed set of social, cultural, environmental, or cognitive "factors" impinging upon specific instances of conduct as though from outside. Instead, the term describes a "reflexively" constituted relationship between singular actions and the relevant specifications of identity, place, time, and meaning implicated by the intelligibility of those actions' (Lynch and Peyrot 1992, p. 114).

By turning the discussion towards ethnomethodological reflexivity I do not intend to imply that positional reflexivity is not important. Indeed, for me it was an essential process of coming to terms with my own logics of enquiry. Although these two types of reflexivities can be seen as belonging to incompatible programs, to conduct my study in the way I did, they were both necessary at different points and for different purposes. In fact, it was the consideration of positional reflexivity and my own the epistemological insecurities that led me to seriously contemplate the constitutive reflexivity of social life, and to consider the production of social research as irremediably bounded to these reflexive properties of social life.

Finding methods of enquiry

Of all the sections in this methodology chapter, this is perhaps the most unconventional. It substitutes the more common 'data analysis' section, where researchers tend to include a discussion about formal methods for analysing data (e.g., thematic analysis, discourse analysis, and so on). Instead, the analysis conducted in this thesis is enabled by the production of very detailed descriptions of classroom interaction, further articulated through various *sensitising concepts* (Blumer 1954) and an ethnomethodological

sensitivity. The aim of this section is to address this last point and explain the way ethnomethodology informs my analytical approach.

A starting point is to consider the way the ethnomethodological notion of reflexivity introduced in the previous section problematises where we might find sources of validity, reliability, and generalisations. The argument here is that an active attention to the reflexive features of a setting provides the ethnographer with devices to produce adequate accounts. Moreover, ethnomethodologists argue that the world that ethnographers aim to study and describe are already competent worlds, in the sense that their members display methods for analysing their ordinary, mundane, everyday affairs. In this sense, members are the first analyst on the scene (Macbeth 2010), and their methods are the instructions we need to observe and follow to produce adequate accounts. Sacks (in Moerman 1988) discusses this when analysing *understanding*, and Macbeth reformulates it in the following way:

> '[T]o speak next, whether at the dinner table or the classroom, is to evidence an understanding of the speaking just done, what action it produces, what horizon of relevant next actions it projects, and, of all things, where the ongoing turn might end, so that we might begin our own. To speak next is to analyse all the things, whose analyses are revealed in the production of an apt next turn, on time' (Macbeth 2010, p. 394).

Through this re-specification of methods, ethnomethodologists invite us to put aside conventional analytic appointments and ambitions – those of 'formal sociology', as they call it – and re-locate those in the *constitutive detail* of social order. What this re-specification of methods means for this thesis is that there is an intentional absence of formal analytical method, although this does not mean that a systematic analysis is not undertaken. Instead, I follow an ethnomethodological approach an consider that, as ethnographers, we can look at members' methods as instructions to learn to see the world from their perspective. Ethnomethodologists suggest that we can follow these instructions to become a competent member ourselves and to produce adequate accounts of events and activities, and this – to a large extent – overlaps with some of the principles of the

ethnographic endeavour. However, an ethnomethodological sensitivity to the study of social phenomena, therefore, adds a certain nuance to an ethnographic project.

A central idea in ethnomethodology is Garfinkel's (2002) *misreading* of Gurwitsch's and Merleau-Ponty's phenomenological investigations of *context*, by which Garfinkel integrated into ethnomethodology a policy of attention to "a figuration of [contextual] details" (Garfinkel 2002, p. 177). From this misreading, emerged a particular notion of context where the items, elements, or given contextual features can be seen as salient from a background to form an identifiable pattern. These contextual patterns are said to 'exist through each other [...] within a system of functional significances' (Gurwitsch 1964, p. 134). According to this notion, context is seeable – by the culturally competent eye – as a patterned coherence (Garfinkel 2002), which elements are reflexively related to one another, and which both the elements and the pattern they form are reciprocally constituting of each other. If one of them is taken away its functional significance is transformed; since the part and its contexture are no longer constituting each other the system of functional significances is modified. Hence, the ethnomethodological *gestalt contexture* invokes a notion of context as instanced or occasioned, locally specific, and situationally constituted.

This approach to the characterisation of context is useful in the task of *defining the situation*. What is suggested by using an ethnomethodological approach to the *characterisation problem* of settings and activities as classroom-specific-work, can be addressed by prioritising the figuration of *lived details* (Garfinkel 2002), i.e., the actual parties of the setting and how their action constitute the context. For example, who says what, to whom, what is the relationship between the parties, where, and on what kind of occasions (see Wieder 1974).

> '"Lived" is key. It is a convenient placeholder for the particulars that it collects by marking organisational phenomena of order* in the aspect of doings *just in any actual case*. [...] 'Specifics are "lived," endogenously-produced, naturally accountable, and therein, and just and only therein, are (witnessable) (observable) details, the observably achieved work of a population' (Garfinkel 2002, p. 168, asterisk used in the original text).

These *lived details* are not just random selected features of the setting extracted for a particular analysis, but they coincide (seeable from the perspective of another member) with the 'witnessable structuring of an activity through which and in which the identifying details of that activity are recognisable' (Livingston 2008, p. 841). Thus, what an ethnomethodological approach suggests is that the *haecceities*[33] of activities and settings are available through the observability of such constitutive elements and the meaning of such is relative to the contextual matters. Garfinkel (2002) recommends that, to find these details, we must look at *perspicuous settings*. Again, not just geographical places, but instances of collaborative practical action as in vivo occasions of inquiry. For him, these are the properties of some 'local gang's work affairs' (Garfinkel 2002, p. 182), i.e., the organisational problem members in a setting are up against. Thus, Garfinkel (2002, p. 190) depicts the ethnomethodological program as that concerned with examining the 'congregational work of ordinary *things*'.

> 'Congregational refers not only to the idea that these social facts are made collaboratively by a group, but that the populational cohort has its character as a cohort or congregation by virtue of being engaged in doing just this thing' (Rawls in Garfinkel 2002, p. 46).

Garfinkel does not suggest here that through this analytical approach we will find the *correct* view of what is this a case of – at least not in a transcendental sense of correctness. By taking this approach we can leave aside discussion about validity, reliability, and generalisation to embrace principles of possibility, plausibility, and recognisability of the lived details of that setting's work as interpretable, discoverable, accountable, and reportable phenomena of order accomplished through members' methods[34]. Issues of

[33] *Haecceity* is a term used by Garfinkel (2002, p. 99) to refer to the 'just-thisness; just here, just now, with just what is at hand, with just who is here, in just the time that just this local gang of us have, in and with just what the local gang of us can make of just the time we need, and therein, in, about, as, and over the course of the in vivo work'.

[34] I find this is common with the ethnographic approach of Atkinson (2015). Especially, when he argues that intersubjectivity is not 'merely a vague (if productive) idea', but a topic of 'empirical investigation and analysis' (Atkinson 2015, p. 79). Suggesting we can stay faithful to Goffman's (1964, 1983) recommendations regarding the *encounter* and the *situation*.

interpretation are closely linked to issues of language. In turn, issues of interpretation and issues of language immediately and inevitably lead to issues of meaning. One of the biggest long-standing debates in sociology and philosophy for which ethnomethodology, similarly to Wittgenstein (1989 [1967]), has a quick fix. In explaining Sacks's contribution Mair and Sharrock argue that:

> '[I]t is not that people do things and then find meaning in them as part of a separate process. It is, instead, that [...] we see what was done in its doing; action and meaning are [...] "internally related"' (Mair and Sharrock 2021, p. 23).

The assumption here is that 'when people [including the analyst] observe scenes they do so configurationally: they observe configurations of persons, activities, locations, objects and so forth' (Hester and Francis 2003, p. 41). Doing so *configurationally* refers to Sacks' (1972) reinterpretation of Goffman's (1971) notion of *normal appearances*. In other words, the conceptual notion of these *configurations* 'constitute a background scheme of interpretation against which the unusual can be discerned' (Hester and Francis 2003, p. 41). In these terms, members' definition of a situation provides for the 'typical and expectable features [...] perceived as a single observable scene by virtue of the fact that they are mutually elaborative constituents of a relational configuration' (Hester and Francis 2003, p. 41). In short, the settings such as classrooms operate reflexively as we see teachers and their pupils engaging in the activity of teaching and learning. In other words, in formulating an argument about how it is possible that teachers are seeable as *that* classroom's teacher and the pupils as their pupils, the following maxim provides a methodological suggestion:

> 'If the parties belonging to some observed scene or activity can be perceived as belonging together then see them that way. [...] if the activity can be seen as

> one being done by the incumbents of a category to which that activity is bound in this context, then see it that way' (Hester and Francis 2003, p. 41)[35].

Hence, the ethnomethodological contribution to the study of meaning is an analytical orientation to see the meaning in-action (Hester and Eglin 1997). Put simply, there is hardly anything we can say, which meaning is not tied to the occasion is which it is produced. Thus, meaning is ongoingly actionable through member's situated analysis. In this sense, 'Sacks's discovery of what was going on in conversation is the discovery of persons engaged in analysis' (Garfinkel in Wiley 2019, p. 179). By these terms, meaning is not private nor subjective, but it is publicly available and methodically achieved through members' actions (Macbeth 2010).

> 'Membership involves a recognised competence in a natural language and observably adequate performance in identifiable speech communities. It involves having one's competence to make reasonable and sensible talk and activities taken for granted. Members, as social actors, assume that the social world is a factual reality which is there for 'anyone' to see and they regard it as commonplace, generally taken for granted environment, which no competent member has problems recognising and acting upon' (Payne 1976, p. 33).

For Garfinkel and Sacks, the notion of member – understood in reference to the mastery of *natural language* – 'is the heart of the matter' (1970, p. 342). In this sense, for an ethnomethodologist, 'if social order (e.g., the orderliness of educational institutions) were anything at all, it has to be first and foremost a *communicative* order' (Watson 1992, p. 263). The argument here is that it is possible to analyse and consider the 'social structures' sociologists are concerned about as 'worded' (or languaged) phenomena; 'we can see institutions of education as an orally accountable phenomenon' (Watson 1992, p. 260). Eglin (2009) uses this idea to reflect about how by invoking concepts for 'university' people realise it as a real-worldly institution. In alignment with Wittgenstein's

[35] In ethnomethodology, and particularly *membership categorisation analysis*, this is referred to as the *observers' maxim* (Hester and Francis 2003) grounded in Sacks' (1974) original *hearer's* and *viewer's maxims*.

Philosophical Investigations (1989 [1967]), to describe the university as a university is to 'reflexively incarnate the university in their language use' (Eglin 2009, p. 43).

That members assume the social world is a factual reality which is there for *anyone* to see, does not necessarily mean that the world exists objectively independently from the eyes that perceive it, nor that this is not experienced at a subjective level. What this means is that routinely members act and interact without problematising the ontological status of actions, objects, places, categories and so on, instead they have methods to objectivate those as factual realities. In this sense, ethnomethodology reformulates *Durkheim's aphorism*[36]. It respecifies sociology's fundamental principle to be that 'the objective reality of the social facts is made instructably observable and instructably reproducible in and as the most ordinary and familiar organisational things in the world' (Garfinkel 2002, p. 119). Ethnomethodology orients studies to observe how vulgarly competent members concert their activities as a matter of 'locally, reflexively, naturally accountable phenomena – in and as of the haecceities of their ordinary lives together' (Garfinkel 2002, p. 191). Indeed, if digital competence as classroom-specific-work was not made reflexively available to others by parties to them, neither I nor any other participant observer (whether an ethnographer or a teacher or a pupil) would be able to locate an instance of a digital competency, as a classroom specific activity in the first place.

Garfinkel (1967) argued that ethnographers doing fieldwork in a setting where they cannot presuppose a knowledge of social structures are well acquainted with the situation in which they must choose between a variety of courses of enquiry and interpretation. Despite the fact they 'cannot "know" what [the participant] is doing *prior to or while [they are] doing it*' (Garfinkel 1967, p. 78), somehow a body of knowledge of social structure is assembled there and then, and 'decisions of meaning, facts, method, and causal texture are made' (Garfinkel 1967, p. 78). For ethnomethodology, and particularly conversation analysis, 'the analysis of language is the analysis of the active production of social organisation, the immanent composing of social order' (Watson 1992, p. 260). Thus,

[36] 'The objective reality of social facts is sociology's fundamental principle' (Durkheim 1982 [1895], p. 45).

social order is seen as shaping and shaped by the locally, sequentially, and situationally occasion of verbal exchange. Order is seen as accomplished from within that same interaction, rather than, theoretically reconstructed, then reassembled, and used as evidence exhibited on behalf of such reconstructions (Macbeth 1991).

In conclusion, one of the main analytical aims was to favour ethnographic *emic* criteria for locating phenomena, developed, and maintained by members of the fieldsite, over *etic* criteria or that brought in from 'outside' (Hammersley and Atkinson 2007, pp. 194-195). In other words, as part of my analysis I routinely question whether the phenomena that I located upon analysis where the phenomena parties in the scene were orienting to (see Garfinkel and Sacks 1970, p. 345; Mehan and Wood 1975, p. 181).

Locating digital competence as classroom-specific-work

In this thesis, the DCF, as a textual object, is not treated as an object of research in and of itself – at least not as if separated from how it coordinates teachers' doing. In following Smith and Turner's (2014) advice on how to deal with texts in ethnographies of institutional settings, I consider the DCF to be *occurring* in definite actual everyday life school settings. This means that I incorporate the framework into the study as it enters into, organises, shapes, and coordinates teachers' doings in the classroom. However, a challenge I encountered in the field was that, although teachers refer to the elements of the DCF to plan activities, in the classroom, the DCF is never addressed explicitly.

Teachers do not annunciate to their classes they will be enacting the DCF for any particular activity. Consequently, I had an initial analytical concern with locating the enactment of the framework as a phenomenon in the classroom. To identify which of the activities and practices observed were potentially categorisable as a phenomenon of interest (i.e., an instance of developing pupil's digital competence through teaching practice), I draw on teachers' own methods to categorise such activities. These methods can be described as a practical application of a set of concepts, skill descriptors, and evaluation criteria collected in the DCF as a frame of reference to formulate, identify, and

achieve concrete educational outcomes[37]. This is a task that involved *making sense* of what these given standardised and abstracted concepts, descriptors, and criteria meant when translated into a concrete classroom activity, as well as the way a classroom activity was in turn categorised and described within such given parameters. Thus, the DCF was used as instruction to locate instances of digital competence as parts of educational objectives of classroom activities. In this sense, one way to see a concrete classroom activity as an instance of developing pupil's digital competence, was to see how the activity could be seen as realising one or more of the various elements of the DCF. Consequently, in this thesis, competence is treated as 'a reflexive constituent of the *work* to which that competence is addressed' (Garfinkel 2002, p. 169). And 'work' is understood as the 'effortful accomplishment' of a task or an activity (Day and Wagner 2019, p. xv), however mundane.

The biggest limitation in taking this approach is to assume that because an activity is recognisable as relatable to the enactment of the DCF, therefore, that is the case. Although it is reasonable to assume that given the circumstances, the recent introduction of the DCF, the kind of school this was, and the fact that I was there to research the enactment of the DCF, teachers were intentionally enacting the DCF for the purpose of the observations. One cannot take for granted, as a researcher, that just because a scene appears to be of a certain kind, therefore it is. A closer and critical inspection is always needed. Here is where a wider ethnographic engagement proved useful. The interpretation of the DCF as instructions was aided by witnessing the teachers' planning

[37] Teachers use an online tool called 'Building Blocks' to plan, monitor, report and assess their educational activities during planning sessions. The tool, developed by The Learning Partnership, is designed to help schools and teachers align their practice to the new curriculum with 'the click of a button' (Building Blocks n/d). Logging an activity involves ticking boxes associated with elements of the curriculum that are deemed as better describing the activity, there and then by the teacher. Sometimes, reading through the elements inspires the teachers to alter the design of the activity to make it fit within a desirable educational outcome. For example, when the teacher team of Year 4 were discussing how to integrate the topic of animal rights into their enquiry, this ended up being translated into a reflection about animals used for video pranks as entertainment. Thus, making the DCF feature as a relevant category for the activity as they formulated it around the topic of 'online behaviour and online bullying'; an element of the DCF strand 'Citizenship'.

sessions[38] (although this was not always the case) and the discussions among teachers during the DCF-related workshops. These workshops, were specifically designed to disseminate, familiarise, and to educate teachers into what a competent understanding of the DCF should be or look like. Thus, by attending to those events, as well as engaging with other dimensions of the fieldsite, I developed a relatively competent members' knowledge, enough to allow me to recognise critically a DCF-related activity as such.

This competency, although it contributed to the ability to identify digital competence in the classroom, could not be taken for granted neither. An attention to the ways notions of digital competence were locally accomplished in recognisable and reportable ways remained relevant throughout the project, as well as an attention to the contextual features that participants orient to. The combination of language use, enacted by particular parties of the classroom scene, the display of recognisable pedagogical strategies, curricular content, use of specific pieces of hardware and software, in a particular time and space between a particular group of people created conditions of possibilities for the formulation and understanding of digital competence there and then.

To help me organise such vast amounts of recorded phenomena, I created a database with information about my observations. A field with a description of the sessions, a field with things I found interesting in my fieldnotes, a field with comments on the videos, and a field with comments on the audios. Putting together this table allowed me to go through all of the materials and identify potential instances for further analysis. Although there was some coding done to organise the large body of data generated as a result of all the records of observations, the analysis consisted of getting close to the data and provided a granular (Atkinson 2017) account of the everyday method of analysis that members use as part of their own routine work in the classroom. No formal coding was required for this, once a *perspicuous setting* – or the 'haecceities of some local gang's work affairs' (Garfinkel 2002, p. 182) – was identified, I transcribed the verbal and embodied actions,

[38] Planning sessions were not filmed, or audio recorded. During these sessions I would sit next to some of the teachers whose classes I was observing and listen to the conversation they would have with their peers. Occasionally, they would also explain to me what they were doing and show me how they were doing it on their laptops.

combined them with my fieldnotes, and transformed them into ethnographic descriptions.

From all the possible instances I could have analysed further, I landed on three: one in which a notion of databases are introduced to a Year 6 class through the enactment of a structured pedagogical dialogue (Chapter 4); an instance of a Year 4 class *in vivo* instructions on how to access and complete an ICT independent learning activity (Chapter 5); and an occasion on which the ICT group of a Year 5 class reports to their teacher a case of insufficient instruction that challenges the teacher's own digital competence (Chapter 6). The findings chapters are organised around a series of fieldnotes and transcript extracts, accompanied by descriptions that sometimes include further ethnographic details, and detailed dissections of relevant social actions. These extracts, descriptions, and dissections compose the body of the analysis.

Although I chose whole segments of interaction for analysis and made them the heart of each chapter, it is worth noting that some aspects of the interaction have been omitted. For example, the episodes described and analysed in the following chapters were populated by incidents in which the teachers interrupted the lessons to sanction pupils' (mis)behaviours. These disruptions have been removed from the analysis with the purpose of offering a more focused discussion. This decision was taken after considering the extent to which I could provide a detailed analysis of instructive sequences and correction oriented to the acquisition of subject knowledge whilst excluding these occasional details. For now, it suffices to say that lessons in primary school contexts – as the literature has reported (Geer 1971; Hammersley 1976; Woods 1983; Delamont 1983; Macbeth 1991; Freebody and Freiberg 2000; Paoletti and Fele 2004; Greiffenhagen 2012, among others) – occur alongside the never ceasing control and management of pupils' behaviours. Control that at times can be detrimental to the task of inducing students to participate, reason, and discuss. As Paoletti and Fele (2004, p. 73) put it, '[a] teacher's work consists of striking a difficult balance between these two contrasting tasks'.

4. Conclusion

This is an ethnographic project with an ethnomethodological orientation to the study of social phenomena. In this sense, it is a hybrid project. On the one hand, it is not ethnographic in a conventional sense. I do not offer a full ethnographic account of learning processes, of the school or the school system, nor of the implementation of the DCF. Instead, I provide a partial account of classroom activities in which the DCF is seeable as being enacted. On the other hand, I avoid taking an orthodoxical approach to ethnomethodology, although I heavily rely on a sensitivity to look at the situated understanding of digital competence as classroom-specific-work and as an object produced from within local categorial and moral orders. However, it is neither a purely ethnomethodological project. The combination of these two traditions has translated the production of an ethnographic account sensitive to the way in which social actions are produced situationally, and the way social structures and order are locally and temporarily accomplished through different methods of interaction and participation. In this matter, I follow Garfinkel's analytical recommendation:

> 'What you want to do is to find yourself in the midst of their lived activities and under those auspices proceed to disclose, to elucidate, to illuminate and to make instructably observable as the revealed details of their local demonstrations, their witnessable demonstration: just what they are doing that is inspectably so' (Garfinkel 2002, p. 211).

The dialogue between ethnographic and ethnomethodological points of discussion on methodological issues is a complicated one, as at times the ethnomethodological tradition shows strict predicates that seem incompatible with those of a more classic interactionist or phenomenological approaches. However, my intention has not been to engage with nor to reproduce the arguments of irreconciliation. On the contrary, my intention has been to test the compatibility of these schools of empirical observational studies of everyday social life. I believe this is possible when the concern is not theoretical, but practical, and it has to do with the ability to see digital competence as a members' phenomenon. From this approach, I have established the importance of natural language in studying teaching practices, since what is going on in classrooms is, to a large extent,

talk. This is not to say that all that happens in a classroom is talk and appropriate considerations need to be taken in this regard (as Chapter 5 demonstrates, embodied actions also constitute a paramount sense making device). Neither that a classroom is an intrinsic educational setting. In fact, situations may emerge that unveil the delicacy of classroom order (as Chapter 6 discusses). Rather it means that the analysis of the organisation of talk will, indeed, represent a large extent of the things that go on in classrooms (e.g., instructions, explanations, and so on).

The study has not set out to explore whether the students actually learned digital competence by meeting the assessment criteria of the classroom activities, or to investigate whether other methods and cases would have done a better job. Instead, this project has aimed at opening the *blackbox* provided by the DCF and its characterisation through the process of teaching digital competence. The focus is on the way that teachers engage in instruction, recruit pupils' participation, and engage with a variety of technologies to make digital competence visible and learnable. The analysis explores the ways parties to the scene orient towards the local, situated, and *practical achievement of understanding* (Lindwall 2008) as properties of the process of learning. Achievements that despite sometimes being of a conceptual and theoretical nature are, nevertheless, 'practical, temporal, contingent, and thereby open to failure, and thereby again, equipped with resources for their repair that are no less actionable' (Macbeth 2007, p. 2).

A main methodological concern throughout this chapter has the possibility of the observability of social actions. That is, 'the connections between action and its recognition and the "possibility" of both' (Mair and Sharrock 2021, p. 21). In Sacks (1992, p. 245) words, 'how it is that any activities... which members do [are done] in such ways as to be recognisable as such to members'. Particularly, in ethnographic research, and particularly in institutional settings such as schools, labs, courtrooms, and so on (as opposed to public spaces) there is a methodological concern about the acquisition of the kind of competency that would allow to effectively observe the *lived details* of the practices, activity, and scene to produce adequate descriptions. This competency does not refer to academic qualifications or having read about the topic (although these might help), but to become a competent member through participant observation and through achieving that *tuning*

in or *homology* previously mentioned. Ethnomethodologists refer to this as the *unique adequacy requirement*, by which the observer/analyst gain at least a *vulgar competency* (Garfinkel 2002; Garfinkel and Wieder 1992) to account for what it is that is going on as an enculturated member[39].

The argument has been that for the practical purpose of making sense of the video and audio recordings and consequently to write adequate descriptions of the events, the participant observation of two months resulted in a *good enough* ethnographic understanding. The required competency in the setting was achieved not necessarily through a prolonged engagement with the field, but through a short but intense participant observation, an *aliquot of ethnography* (Atkinson 2015). This participation was in turn enhanced by the ability to re-watch and re-listen – potentially endless times – the educational occasions I had witnessed during my ethnographic fieldwork.

In the following chapters (Chapter 4, 5, and 6), I focus on the description and analysis of three classroom observations and used them as occasions to discuss topics such as the display expertise, the co-production of knowledge, software affordances as interactional accomplishments, and practical adaptation of technical knowledge. In doing so, I describe the locally occasioned methods of teachers and students that make these activities possible. In focusing on the three observations mentioned above, I am able to provide an instructive report of the situated enactment of a curriculum, considering the resources (social and material), the barriers to learning, and the categorial relationships, within the classroom. By these means I then answer in Chapter 7 the research questions raised in Chapter 2.

[39] Although there some significant conceptual and practical differences, in the field of STS, the idea of *interactional expertise* (Collins and Evans 2002) is used to denotate a similar issue.

Chapter 4: Pedagogical dialogues for 'technical' vocabulary teaching

> 'Education is the acquisition of the art of the utilisation of knowledge' (Whitehead 2018 [1916], p. 5)

In this chapter, I examine the ways in which knowledge is *utilised* to accomplish the introduction of technical vocabulary. The discussion is based on the analysis of fieldnotes and a videorecording of an instance of classroom interaction in which Miss Hughes, the teacher, introduces the notion of a database to her Year 6 class. The chapter describes the way that Miss Hughes implements a series of pedagogical strategies to accomplish this task, mainly relying on what can be identified as a mix of *heuristic* and *constructivist* methods[40]. For the most part, the teacher asks questions to the pupils, making pupils active participants in the shaping and unfolding of the lesson. Through this *pedagogical dialogue*, the class produces – in a very local and temporal sense – an understanding of the term 'database'.

Foregrounding the analysis are three guiding questions: (i) *What kind of resources do teachers and pupils draw on to collaboratively accomplish educational outcomes, such as the introduction of a technical term?* (ii) *In which ways are these resources being utilised?* And (iii) *what contingencies do participants orient to?* In other words, considering the way the task of introducing the notion of a database is accomplished, the chapter examines the resources parties of the scene rely upon to produce 'a relatively more esoteric 'subject' knowledge' (McHoul and Watson 1984, p. 281) and the contingencies that shape this encounter. Of course, what constitutes an *esoteric* object of knowledge is a relative matter. 'Some knowledge is esoteric [...] Most is mundane. Some is both at once, and which is mundane, and which is esoteric depends on who you are' (Delamont

[40] *Heuristic methods* are pedagogical strategies by which pupils are treated as discoverer. They prioritise the process by which students '*finding out*, instead of being merely told about thing' (Armstrong quoted on Atkinson and Delamont 1976, p. 131). Whereas *constructivism* is here referring to the pedagogical strategy that places students' contributions at the heart of the learning process, and which prioritises *meaningful* instruction and tasks that reflect problems in the real word (Schreiber and Valle 2013).

2014, p. 2). In this sense, contextually speaking, it is important to consider the following features of the setting: it is a formal setting for early years mandatory education, there is an age gap between instructor and novices, and the events happen during the early stages of the integration of the DCF.

In analysing the pedagogical strategies, I pay attention to the way the dialogue is produced and made accountable as a phenomenon of order reflexive of the setting in which it is produced. More concretely, this chapter focuses on the examination of the way in which the three-turn sequence[41] structures the dialogue between the teacher and her class to produce associations between terms, and to assemble conceptual boundaries for the term database. These *associations* and *conceptual boundaries* are seen as local, practical, and collaborative accomplishments for the purposes of achieving a desired educational outcome: learning what a database *is*. Furthermore, the chapter demonstrates how in accomplishing these associations and conceptual boundaries, the participants navigate interactional contingencies.

The chapter is organised around three main sections followed by a discussion and a conclusion. In the first section I provide some background context to the scene and some ethnographic detail that frames the relevance of the case for this thesis. In this section, I also depict the way the lesson begins with the teacher introducing the idea of a database as relevant in the educational trajectory of this Year 6 class, and how she then shifts to make them remember a website they had been exploring called 'Skyscanner' (implicitly treated as a real-life example of a database). The second section analyses how the teacher guides the lesson towards "making the link". Miss Hughes asks the pupils to provide nouns that could fit the description of what Skyscanner *is*, with the aim of arriving to the following conclusion: Skyscanner, among other things, is a database. This section shows the way the teacher guides the pedagogical dialogue by occasioning a series of rules regarding what counts as a *good* or *good enough* contribution. It also demonstrates how

[41] This was referred to in the literature review as the question-answer-comment (Q-A-C) (McHoul 1978) or the initiation-response-evaluation (IRE) sequence (Mehan 1979). Typically constituted by (i) a question posed by the teacher, (ii) followed by a student's response, and (iii) a teacher's remark on the adequacy or correctness of the student's response.

the problem of *infinite possibilities* (infinitive possible answers to the question of what Skyscanner is) is worked out and choices narrowed to one possible outcome. Here, I document the resources both pupils and teachers utilise to accomplish the educational task: making the association between Skyscanner and databases. In the third section, I examine the way the teacher recruits and evaluates displays of understanding of the association just produced. It shows how the boundaries of what is a *good* display of understanding is attentively curated by the teacher, who uses every contribution as an occasion to add texture to the lesson, usually through the production of *corrections*.

1. Introducing the notion of a database

In the following pages, I discuss a classroom interaction that took place on a Wednesday morning in the Autumn term for a Year 6 class. For that morning, Miss Hughes, the teacher, had planned a *carousel*[42] consisting of three activities: (1) a teacher-focused group doing divisions in their maths books; (2) an independent learning activity for practicing more divisions on a scrap paper; and (3) another independent learning activity consisting of "playing with" and "exploring" Just2Data's Databases[43] as a preparatory activity for what they would do on their next session. Allowing a time to explore of a piece software before using it is an encouraged pedagogical strategy in this school:

> "Before they can create their own database, let them play with one", "guide the pupils through how to do a database in J2" (short for Just2Easy), "you need to think hard about the learning that is going on, to make things purposeful",

[42] The word 'carousel' is used by teachers to refer to the organisation of their sessions. They divide the class into groups, the session into time slot, and the classroom into areas. Each group is at a designated area doing a particular classroom task (either as a teacher-focused group or as an independent learning activity) at every given time slot. Once a time slot is over, groups *rotate* to a new area and, thus, engage in a different activity, until all groups have done all the activities. The idea is that, in this way, the teacher gets to focus on a smaller group of pupils at the time, which in turn is supposed to help pupils engage and participate more.

[43] Just2Data is a digital educational tool designed to help schools to meet the 'data handling requirements of the national curriculum programmes' (Just2Data n/d). It is part of J2Easy (the tool suite), and it includes tools to insert, handle, and represent data, as well as lesson plans and activity examples.

> "have a bank of questions and use concepts to engine an enquiry-based task". All of these were recommendations given by Mrs Jones, the school's Digital Lead, to teachers in a workshop about data. Even when she recognised that, on the one hand, "J2 is not perfect; it can be quite temperamental" and, on the other, making relevant concepts such as *data* to children can be difficult. For this reason, her insistence on finding ways of making learning purposeful, based on "real life" experiences – [Fieldnote Extract 1]

The Inquiry Base Learning (IBL) approach that the school follows emphasises making the process of learning relevant to the *real word* experiences of the pupils, and to make learning meaningful and practical to become successful citizens of the 21st century. The learning outcome is not necessarily the product – the answer to the enquiry – but rather the development of skills for *investigating*, *exploring*, *searching*, *questing*, and *researching* (these are the formal steps of the IBL approach). In short, the intention is to utilise learning abilities to pursue enquiries over different domains of knowledge. The learning outcome is, in a way, the acquisition of *lifelong learning skills*, to become an independent learner. Consequently, there is also an emphasis on the teacher's role as the one *guiding* the process. By providing the conditions for pupils to self-develop and, to an extent, by "letting the kids lead the activities", they become "facilitators", Mrs Jones explained.

What follows is a demonstration of an instance of classroom interaction in which the teacher implements this approach. On the one hand, time and space has been allowed for pupils to engage freely with the software before instructing what to do with it, they have also been introduced to a *real* example of a database in use. On the other hand, the teacher does not just lecture, but makes pupils active participants of the lesson, facilitating the educational outcome.

Beginning the lesson

The whiteboard is projecting Just2Data's menu. The menu features the different educational tools that comprise Just2Data, such as Pictogram, Chart, Branch, and Database. There is twenty minutes left until the lunch break and the teacher asks the pupils to tidy up the room and sit on the floor facing the whiteboard. The teacher

monitors the arrangement of the class by providing indications and adjustments as to who could sit next to whom[44]. Once the students are seated in silence, the teacher initiates the first turn of the lesson; she produces an utterance see-able as indexing the starting of a lesson (see Payne 1976; Eglin 2009):

> "So, on J2 – obviously you have done some of these things before – you can make graphs, you can make pictograms, histograms. But when you're in Year 6 you need to start thinking about databases" [Transcript extract 2].

This start of the lesson consists of reminding the pupils what they have previously done on "Just2" (here standing as short for Just2Data). This action not only establishes Just2data as a relevant item in the lesson (the software package they are going to be using) but sets the first frame of reference for pupils to draw upon. Sociologically speaking, one can argue that through this action, the teacher imposes a *definition of the situation*, at least in Schütz's (1973) sense. Miss Hughes establishes the direction of the next actions in quite an explicit way: the class needs to "start thinking about databases". The situation imposed by the teacher is biographically determined, i.e., it has its *history* (Delamont 1974), in the sense that it is significantly embedded in the educational trajectory of the class. In turn, this act of embedding the lesson in an educational trajectory is a method for making this beginning of a lesson recognisable so. As Garfinkel (2002) put it when studying the work of teaching undergraduate chemistry:

> 'We could speak of it as a tying procedure, delivered as a prefatory statement to whatever they are being called on to remember, that points out the present instance as a document of the history to which they are held responsible' (Garfinkel 2002, p. 233).

Garfinkel argues this *tying procedure* tends to be specifically visible because they are produced to be recognisable and instructional. In other words, it instructs the students a lesson is starting, and this is recognisable by virtue of what they are *doing* just then and

[44] While Miss Hugues is only twenty-four, she is also impressively organised, and quite stern. She is proficient at delivering a lesson whilst keeping this class of thirty preteens in line. She does this by constantly and sarcastically commenting on the appropriateness of their behaviour. Miss Hughes' strictness is key to accomplishing a successful lesson with these juniors.

there; it is a classroom-specific event, marking the start of the lesson. Moreover, by naming the things they have already done in Just2Data, the teacher is also listing the main features of the software: Pictogram, Chart, Branch, and Database. Thus, linking the visual information available on the whiteboard, the software they will use, with the lesson's topic. In this regard, it is worth mentioning that whilst Pictogram, Chart, and Branch are designed for Key Stage 1 to 2, Database is designed for Key Stage 2 to 3[45]. Consequently, as pupils in their last year of the Key Stage 2, doing databases is normatively formulated as a requirement – they "need to start thinking about [it]" – to be successful incumbents of the category 'pupils of a Year 6 class'.

Following this introductory turn, the teacher asks the pupils if they can remember that a few weeks before they were exploring a website, and if they remember the name of the website. This website is Skyscanner, a popular website containing a search engine for flights, and it is implicitly made relevant to the class as a database existing *out there* in the world. What follows can be described as an interactive, but very systematically produced, pedagogical dialogue. The teacher asks why adults would use Skyscanner to book flights, and the pupils produce a series of contributions (e.g., "it's easy to use" and "it's quick"). The teacher evaluates these contributions, whilst using them discursively to move the lesson forward. Through this question-answer interactional format the teacher collects enough discursive items as to formulate an argument about the convenience of having "all that information available" (destinations, prices, etc.) to consider different options and make the most informed decision about which flight to book. Thus, foreshadowing an argument about the usefulness of databases in the real world.

The activity of remembering the website's name also sets up the *participation framework* (Goffman 1981) which is carried out throughout the rest of the lesson. In this sense, a first observation is that the ability to formulate objects of knowledge requires the

[45] One can see that in the description of the tools visually available through the projection of Just2Data menu. But also, when the tools are explored, the design of each app renders apparent who is the targeted pupils' age/developmental level group. Unlike Pictogram, Chart, and Branch that are image-based, Database is more textual, and it allows more complex tasks to be done (e.g., the pupils can store a variety of file types, create tables and graphs, among other options).

organisation of discourse to give form to such objects, and in turn it requires actors to be able to recognise and work with those objects.

2. The lesson as a task – "making the link"

> "Do you know if there is a different name for a website like Skyscanner? I wonder if you can make the link because you have all used it... If you had to say what Skyscanner is in one word, what word would you choose? ((pupils start raising their hands)) Let's see some ideas" – [Transcript extract 3] [46]

The teacher initiates the next part of the lesson by asking the class if they knew a different name for a website like Skyscanner. "I wonder if you can make the link", Miss Hughes said. Here, "making the link" implies connecting Skyscanner to something the teacher can reasonably presume they already know. An activity like this requires the participants to make associations between domains of knowledge knowable to them. Otherwise, it would be an inefficient method to produce the desired educational outcome. As it was the case, Miss Hughes began the lesson stating that by Year 6, they needed to start thinking about databases. Additionally, they had been exploring Database (on Just2Data) that same morning. "Making the link" is a task for which the teacher has been building up – at least, this is seen in retrospect.

Whilst the teacher formulates this question, with the recipient being the cohort of students in general, a few of the pupils raised their hands to be selected as next speakers. Thus, they demonstrate that they (or at least some of them) are actively listening to the teacher and already thinking of candidate answers. Despite some pupils being eager to participate, Miss Hughes continues by providing one criterion for answering: they have to formulate "one word" to name what Skyscanner is. To emphasise this requirement, she gestures by lifting up her right-hand index finger. This gesture can be seen as implying that, although there might be many possibilities for naming Skyscanner, there is only one among them that will make "the link". What follows documents the way the problem of infinite

[46] (([text])) is used to insert a description of embodied actions in the transcription of talk.

possibilities is worked out by the production of rules and criteria that narrow down the possible candidate answers to one.

Rules and criteria as pedagogical cues

A number of pupils have their hands raised, waiting to be picked up by the teacher. The teacher walks across the front of the classroom, points at one of the pupils, and says "go on Kevin". Kevin answers "interesting", and the teacher responds:

> "Interesting... Think a little bit more about what it actually is. Yes, it's interesting. I don't doubt that Kevin... But if you have to say to someone 'oh, Skyscanner is <<a>> _____', what would you say?" – [Transcript extract 4][47]

Through this turn, one can infer that the teacher deems Kevin's answer as insufficient. We see this in the way that the teacher invites Kevin – and the rest of the class – to "think a little bit more about what it actually is". Within the frame of the request: "a different name for a website like Skyscanner", the conventional use of the word 'interesting' does not make grammatical sense, and she is orienting to this when evaluating Kevin's contribution. However, the teacher immediately repairs and acknowledges 'interesting' as a word that could work for the task of describing Skyscanner. "Yes, it's interesting" she says. This repair suggests that although the answer did not *make sense* within the frame of the request think-of-a-different-name-for-Skyscanner, it made sense within the frame of the request say-what-Skyscanner-is-in-one-word. Through this repair, the plausibility and recognisability of Skyscanner as something interesting was made accountable by the teacher to the rest of the class. This acknowledgement – which, in a way, saves face for the pupil – also points to a repair in the teacher's welcoming of contributions. This can be seen as a strategy to not discourage pupils' participations.

Accepting this possibility leads to the recognition of a potential and reasonable misunderstanding regarding the specificities of the request. Miss Hughes takes the

[47] << [text] >> is used to reflect prosodic emphasis in talk.

opportunity to formulate a more specific task: to find a word that fits within the sentence "Skyscanner is *a* _____". The teacher emphasised the word 'a' with a long pronunciation and made obvious the absence of the next word by pausing and gesturing with her hand (this has been highlighted in the extract by using the symbols <<[text]>>). Here, the silence produced by the pause symbolises a missing piece and the absence becomes an instructional matter. Additionally, the emphasis on the 'a' provides a clue to the kind of word Miss Hughes is asking her class to guess. Drawing on the kind of stock knowledge *everyone knows*, we can assume the teacher is orienting to the grammatical features of the sentence. Through this grammatical criterion, choosing words among a potentially infinite option is narrowed down.

One can say, then, the criterion follows a grammatical logic, which we see in the way the sentence is built, yielding the use of a specific kind of lexical item to complete the sentence, namely a noun in its single form; a word that would function to name a specific object or aggregation of objects. I want to emphasise the verb 'functions' because, I am not suggesting that words belong to lexical categories outside of their situated use. 'The meaning of a word is its use in the language', as Wittgenstein (1989 [1967], sec 43) claimed, and 'rules of correct usage can vary in their sense depending on the particular way the rules are used "this time"' (Wieder 1971, p. 109). In this case, the teacher's turn makes the use of a grammatical rule accountable to the class. In other words, for all practical purpose (Garfinkel 1967), 'interesting' is not understood as a name. By reformulating the original question, the teacher reinforces a particular scheme for interpreting the task of "making the link", and, although her turn is produced as a response to the pupil's contribution, it is in fact directed to the whole class.

Among the children with their hands raised, Miss Hughes picks Laura as the next speaker, who proposes the word "app". Laura's contribution confirmed the rules imposed before and we see this through the teacher's evaluation turn:

> "Okay! It's an app. ((Miss Hughes brings her thumb up)) You could say it's an app" – [Transcript extract 5]

As Miss Hughes confirmed that 'app' was a valid word to fit the sentences "Skyscanner is a _____", she brought her thumb up. Whether experts would agree that 'app' is a correct term to define what Skyscanner is[48], for all practical purposes, in this moment in this class, it is. This is seen in the association between "app" and "Skyscanner" is built through Laura's correct understandings of Miss Hughes's instructions; to complete the sentence "Skyscanner is a _____". Through this evaluation, we see the word 'app' as qualifying as an adequate contribution, not only because we can use the grammatical logic proposed above to see how it fits the sentence, but the teacher verbally and bodily ratifies it.

Nonetheless, the contribution is not sufficient in the sense that it does not produce a closure to the activity "making the link". We see this through the teacher's re-actions. The teacher immediately lifts a thumb up and requests another contribution to add into the just-started list of names. Miss Hughes makes this hand gesture distinguishable from that of bringing a thumb up as *okaying* in that she leaves it up until the pedagogic strategy is changed, and as we see later on, for each adequate answer she lifts a finger up to keep count.

The teacher's embodied movements are reflexively adjusted not only to her own actions but also to the responses of the children as co-participants of the lesson. Their responses are arranged progressively as 'a complex multimodal Gestalt' (Mondada 2014, p. 138). The emergent construction of this multimodal Gestalt is done in response to the contingencies found in the accomplishment of the task. In this sense, gesturing is a meaning-making resource that does not operate independently from verbal language and the situation in which it is produced. Instead, embodied actions are mutually constitutive, i.e., you get their meaning from the way each of them operates sequentially in the context and along with other actions. So, when the teacher brings her thumb up, the class can recognise she is signalling a valid contribution had been made, it was one among many options, and it was not enough to reach the lesson's closure.

[48] Technically, it would have to be a 'web app', since 'app' (short for 'applications') is used to refer to a computer program/software downloadable to mobile devices (phones, tables, watches, and so on).

The answer not being *correct* does not mean, as it has already been established, that it is not an adequate contribution. These kinds of contributions prove of great value in the continuity of the pedagogical dialogue as it enables the validation of methods for producing adequate answers. Moreover, it adds *volume* to the subject knowledge under discussion. As is highlighted later in this chapter, there is an underlying criterion of semantic sense operating by which the acceptability of contributions is determined. This is whether certain names are seen as associable to the topic of Skyscanner in the context of introducing the notion of database. Consequently, although the main task is "making the link" between the words 'Skyscanner' and 'database', a secondary task emerges. This is to produce a list of acceptable associable terms that fit the criteria of the main task. We see this in the way Miss Hughes continues the dialogue by asking Hayley "what else?".

Hayley starts elaborating an account by building from the previous contribution; "it's a good app to look at...", but the teacher quickly interrupts her. The reason to discard Hayley's contribution is accounted for by the teacher, who articulates a previously formulated rule:

> "Okay. I'm going to say one word. That's the challenge... 'App', I'm going to take it from there" – [Transcript extract 6]

The teacher seems to accept the sense of Hayley's utterance (or at least how it was being projected). We see this in the use of "okay", which is commonly used as token of agreement. However, she repeats one of the criteria established at the start of the activity to evidence the inadequacy of Hayley's contribution. The activity of "making the link" started with her asking the pupils to choose one word to say what Skyscanner is. In repeating this rule, Miss Hughes does not orient to the fact that she is repeating it. Instead, she propositions following the rule as a "challenge", and then orients back to the task of listing adequate answers, starting with 'app'.

The preference for avoiding direct rejections is of significance in understanding that whilst the teacher is instructing pupils on the activity, she is also gathering information from the room to produce meaningful turns that will lead to the accomplishment of the desired

educational outcome: "making the link". If the pupils cannot make the link, that is a teacher's problem; she is failing as a facilitator.

> 'The interpretive procedures and their reflexive features provide continuous instruction to participants such that members can be said to be programming each other's actions as the scene unfolds' (Cicourel 1971, p. 152).

It is argued that questions like the ones produced by Miss Hughes, namely, questions-with-known-answer are not just asked to *test* the students' knowledge (Lindwall *et al.* 2015). They are, first and foremost, instructive utterances, designed to ensure the students orient to the task of *discovering* an area of knowledge. To borrow from Macbeth (2000, p. 26), the teacher is here 'engaged in pulling a world-for-remark into view, and the students are not simply responding, they are finding the world she is pointing to'. Each reformulation of the question makes it clearer what it is the teacher is after. In this way, each time the students are provided with additional resources for coming up with a locally appropriate answer. Through the exchanges described so far, we can see pupils figuring out what it is the teacher is asking them to do. In figuring this out, pupils' contributory attempts become useful materials in making the lesson a lesson, in its *manifest* sense "thinking about databases", but also in its *hidden* sense, learning to listening and understanding instructions through questions. Mirroring this, we also have a teacher engaging in the task of figuring out ways of facilitating the lesson by producing and reinforcing rules as the interaction unfolds.

This observation aligns with Lee's (2007) critique of the notion of the three-part instructional sequences – that is, the questions-with-known-answer generated by the teacher, followed by a pupil's answer, and culminated with a teacher's evaluation – as a mere evaluation (see McHoul 1978; Mehan 1979; Sinclair and Coulthardt 1975). For Lee (2007, p. 181) the teachers who produce these turns 'come to terms with far more local and immediate contingencies than what is projected by blanket terms such as 'evaluation' or 'feedback". In this sense, the third turn is contingent on the answers of the students. As the scene described so far demonstrates, the pupils' contributions can display particular problems which the teacher orients to by formulating 'the resources needed for the students to come up with the sought-for answer' (Lindwall *et al.* 2015, p. 153). This

might involve reformulating the question, steering the pupils towards a particular direction, explicitly indicating what types of contributions are adequate, managing who gets to provide the next contributions, and so on.

In and out the boundaries of 'good enough' answers

Making the association between the words 'Skyscanner' and 'database' takes several rounds, guesses, and back-and-forths. In fact, it is not produced through the three-turns sequences the teacher has been pursuing so far, but I will get to that in the next section. Instead, this section shows that despite the teacher's (and the pupils') efforts, pupils failed to produce the *correct* answer, even when they effectively enacted the interpretive procedures to follow the rules and provide adequate (or at least 'good enough') candidate answers.

When the contribution is deemed not *good enough* to be added to the list of candidate answers, this *contingency* – as it was defined previously – yields a reinforcement of rules and criteria in every third turn, which is also characterised by a tweak in the approach to formulating direct rejections. For example, when the teacher asks Natalie "what else" can be used to name Skyscanner, she suggests the word "useful". The proposition of this word as a candidate answer produces a similar evaluation than before, when Kevin suggested "interesting". However, the tone of the correction is significantly different. Whereas before we saw a preference towards avoiding a direct negative evaluation, this time the teacher resources to a plain "no", followed by a reiteration of the grammatical logic previously established:

> "No. 'Skyscanner is a _____'. No describing it. I don't want adjectives. I want what it actually is. A noun. Tell me the name of it" ((the teacher gestures with her hands)) – [Transcript extract 7]

As the teacher utters this, she emphasises rhythmically with a hand movement for each sentence. In comparison with the previous disagreements, this time, Miss Hughes does not hide her negative evaluation. It is not mediated, nor is a partial agreement offered. She has already repeated her request four times. This time, however, the grammatical

logic is reformulated by substituting the word 'name' for 'noun'. This reformulation implicates the expectation of a stock of knowledge pupils can and should rely upon. This requires them to know what an adjective and a noun are, and how they are different from each other – knowledge that can be reasonably assumed by the teacher of this Year 6 class. Still, Miss Hughes facilitates the difference by attaching adjectives to the act of describing and nouns to that of naming. When this expectation is not met, one might assume that either the pupils do not know it or, more likely, they have not been paying enough attention to the formulation of the questions. This grants reasonable grounds for the teacher to produce a more severe rejection.

The teacher resumes counting the list of possible candidate names by uttering the last valid answer, "an app". From here, she asks Pam to provide a possible answer, to which she suggests "a website". The teacher repeats it, as she often does for ratifying pupils' actions. "A website" she said, emphasising the word by extending its pronunciation. She also brings a second finger up and announces to the class that there are "a few more". A gloss used to indicate that there are more candidates *good* answers that pupils can reasonably be expected to provide to the question: what is Skyscanner?

Although the teacher does not produce an explicit acceptance or rejection to Pam's answer, the answer is nevertheless shown to be acceptable by virtue of the teacher's ratifying actions. Pam's contribution fits all the grammatical and semantic criteria: it is one word, it is a noun, and it belongs to the semantic landscape of Skyscanner. In fact, it is a term the teacher used to name Skyscanner at the beginning of the session, when she asked them to remember "the name of the website". As with 'app', 'website' is treated as a *good* answer, but although it does not produce a reinforcement of the rules, neither does it conclude the exercise of making the link. Consequently, Jonathan is asked next.

Jonathan proposes Skyscanner is "a guide". The teacher raises a third finger and indicates they are "getting closer"; another *good* answer has been produced. This contribution, as with Pam's is regarded as adequate, as it brings a third finger up for the counting of valid names, but it is not sufficient; again, it does not conclude the activity. The teacher then asks Tony to provide a next candidate name.

Tony hesitates – "like... mmm" – and finally suggests "instructions?" with certain doubt. In response, the teacher accepts the contribution and attempts to reformulate the contribution to account for its acceptability:

> "Okay?! An instruct- ((Miss Hughes brings another finger up)) it could be an instructor on how to book flights" – [Transcript extract 8]

One could try to apply the criteria discussed so far to do the exercise of evaluating the adequacy of the answer. In other words, one can ask the following question: does "instructor" fit the numerical, grammatical, and semantical criteria? If so, how we see this? "Instructions" is one word, and it is not an adjective. It is a noun in its plural form. The teacher transforms it from an object to an agent, "an instructor" and produces a local definition of Skyscanner: an "instructor on how to book flights". What she does here is to complete the sentence: "Skyscanner is a[n instructor on how to book flights]", where "on how to book flights" is added as necessary to produce a semantical adequacy.

One can understand the sense of the teacher's repair even if we accept it is not a perfect sentence or precise definition. More importantly, what we see is that, for the practical purpose of moving forward with the lesson, the teacher treats the contribution (that she co-creates) as *good enough*. Good and good enough-ness are here a locally accomplished phenomena, witnessable through the collaborative constitution of the relationship between instruction (the questions), instructed action (the answer), and the third turn (the repair). In this sense, the absence of a direct rejection and the fourth finger up, along with the modification of the word (from 'instructions' to 'instructor') to make it fit, are constitutive features of an evaluation oriented towards a local sense of *good enough-ness*.

A few more sequences follow, where similar corrections to that produced for Natalie's contribution are made, which refer back to the grammatical and numerical rules already established. From these sequences, the last one – when the teacher asks Shannon and she suggested "travel" – is of particular interest as it makes obvious a criterion that has been lingering but not made explicit yet.

> "Okay? But you wouldn't say 'Skyscanner is a travel' ((children laugh)) Would that make sense? I know what you mean but it needs to make sense" – [Transcript extract 9]

One can apply the same procedure to assess the adequacy for good enough-ness here. The word 'travel' complies with both pre-requisites, it is a noun and is just one world, and in this way is partially accepted. One sees this is the teacher's use of the marker "okay", even if it is used tentatively. However, the answer is assessed as not adequate and we see this in the teacher's suggestion that "you wouldn't say "Skyscanner is a travel"', which is hearable as a universal statement. It is not that Shannon uniquely would not say that (in fact she has just done so), but people in general, would not say that. In simple terms, the implication is that it does not make sense. This instance highlights the methodic or procedural organisation of commonsense regarding how to implement the rules to provide a good answer, which renders available a sense of *adequacy* as contrasted with a pattern of culturally methodic social action. Garfinkel's (1967) *documentary method of interpretation* is the idea underlying this part of the analysis. Garfinkel, in a purposeful misreading of Gurwitsch's work suggests that members rely on a 'family' of lay sense-making practices whereby coherence is assembled into an array of 'particulars' by interpreting them in terms of an underlying pattern. 'The particulars are, individually and collectively, taken as 'indexing' or 'pointing to' such a pattern and as warranting its imputation: in turn, the pattern is employed to render the particulars identifiable as a related homologous collection' (Watson 1997, p. 55) – which, in this case, the work "travel" is not part of.

Immediately after the teacher asserts the statement "you wouldn't say 'Skyscanner is a travel'", pupils laugh in unison, which allows one to suggest there is a jocular sequence. We can infer this because of the presence of laughs often points to the presence of such a phenomenon. The question, however, is: what is making them laugh? Here, we may see laughing as pointing at the lack of sense or incongruity of the pupil's suggestion. However, the laughing does not occur after Shannon's turn, but after the teacher explicitly and condescendingly exposes the problem with her contribution. Orientations towards failure or incongruity reveal the sense of a frame of presupposed acceptability. Here, the

sanction for not seeing what *everybody knows*, namely that the word 'travel' is not adequate in the context of naming Skyscanner. The teacher's comment exposes an underlying logic to which Shannon's contribution shows incongruency; the tool that helps people manage/organise a domain of activities, cannot be the activity itself. Commonsense is a logic operating in the background, and it is brought up as relevant when it is violated, attested by the members' actions. This does not mean that commonsense is a logic to be understood in a formal or theoretical way, but as with the previous rules, it is an occasioned resource to account for the insufficiency of the contribution in the frame of the activity making the link between Skyscanner and the notion of a database. Moreover, unlike previous rules that can be formulated explicitly, commonsense is tacit. When the teacher says, "it needs to make sense", there is no strict sense in which this expression can be articulated. To define what makes sense is to engage in a relentless task of elaboration.

Even though the teacher recognises there might be some sense in the answer, and we see this when she says she *knows* what Shannon *means* – after all Skyscanner is related to travelling as an activity – we can also see the teacher producing a repair for having contributed to a jocular situation on Shannon's behalf. The repair is designed to save Shannon's and the teacher's face within the educational encounter. Nevertheless, Shannon's turn still treated as not making *good enough* sense to qualify as an assertive contribution, and the activity is brought to a closure. The teacher's comment exposes a treatment of Shannon's answer as incongruent to some sort of commonsense: the tool that helps people manage/organise a domain of activities is not the activity itself. Commonsense is thus revealed as a logic operating in the background, and it I brought up as relevant when breached. As with the previous rules, it is an occasioned resource that functions to account for the incongruity of the contribution within the frame of the activity "making the link". However, unlike previous rules that could be formulated explicitly, commonsense is somehow tacit. When the teacher says, "it needs to make sense", there is no strict sense in which this expression can be articulated. To define what makes sense is to engage in a relentless task of infinite elaboration. However, we can understand what the teacher means because she is relying in the kind of stock knowledge *everyone knows*.

The unfolding of this pedagogical dialogue demonstrates the way the teacher establishes criteria for determining *good* and *good enough* answers (that follow the locally occasioned rules, and which goes into adding up a list of semantically relevant objects), and those that do not follow the rules and are treated as *not good enough*. In doing so, we see knowledge production is here bound to the contingencies of the three-turn sequences as pedagogical strategy, contingencies that are in turn dependent on each moment's setting configuration (its active participants, their interpretive abilities, the knowledge they are able to draw upon, the relationship among them, the interactional framework, need to move forward the lesson, and so on). As none of the exchanges produced the *correct* answers, the teacher resorts to a different pedagogical strategy.

Games as ultimate pedagogical strategies

> ((The teacher grabs a pen and walks towards one side of the whiteboard)) "So the word I'm thinking of- So we had 'guide', we had... ((the teacher writes 'Guide' in the whiteboard)) what else did we had? ((pupils answer 'app')) 'app', thank you ((the teacher writes it below 'Guide')) We had 'website' ((the teacher writes it below 'App')) We had all these different things... There is one I'm thinking of, and it begins... let's play 'read my mind'" ((below 'Website', the teacher draws eight consecutive lines and a capital "D" over the first line on the left: D _ _ _ _ _ _ _)) – [Transcript extract 10]

As she draws the lines, adding a D on the first of them, she verbally indicates the word she is thinking of starts with the letter "D" and asked the class to try to first guess the whole word. This change of strategy narrows down even more the possibilities of asserting the correct answer, for it establishes two more criteria: starts with the letter 'D' and it is an eight-letter word. This game of "reading" the teacher's mind is a version of the hangman game, but where she asks them to guess the whole word, rather than guessing letters contained within the word, and where she does not count the number of mistakes that usually translate into *the hangman*.

Teachers often rely on visual resources for doing teaching. In this episode, the whiteboard plays an important role. It is meaningfully included in the accomplishment of the lesson;

it is sequentially relevant as the teacher implements it in the production of new instructions for this new part of the activity "making the link" (with two implied new criteria for guessing). Simultaneously, whilst all this time the menu of Just2Data has been projected on the whiteboard, so the word 'database' has been available all along, now this is visually co-present with a visual inscription of the correct answer (even if this inscription takes form in its absence).

Several attempts to guess the word are produced. Firstly, a child suggested "document":

> "No! But that's not bad. A document would be something like what I put in Google Classroom for you" – [Transcript extract 11]

Miss Hughes starts by disqualifying the word, but she recognises its possibility, "it's not bad", as it complies with the criteria. Additionally, she formulates a justification for the partial disagreement by locally and situationally defining what a document *is*. This definition is tied to a local system of relevance; that is the digital environment is the relevant context against which names are being evaluated. Additionally, the production of a direct rejection at the beginning of the turn hints towards the abandonment of the list of candidate names. We see this also in that no more words are added to the list, neither a finger is raised up. Thus, although the evaluation is similar to that produced for *good* answers, for the activity "read my mind" the *correct* answer is the only contribution accepted.

Miss Hughes repeats "a document" and invites Helen to speak next. Helen proposes "director", and the teacher produces a correction similar to when she dealt with 'instructions':

> "No! It does direct you to different flights. We're getting closer" – [Transcript extract 12]

Again, the teacher disqualifies the answer by producing a direct rejection ("no") but treats it as a partial disagreement. We see this as the word is reformulated into a verb to fit the sense of the contribution that the teacher is making ("it does direct you to different flights"), which is emphasised by the inclusion of the verb 'does' as a repair to the first

direct rejection. In producing these partial disagreements one can think the teacher is trying to not discourage pupils' participation. As in the previous turns, Miss Hughes closes this turn by claiming that they are "getting closer", indicating a sense of progression, and asks Annie to contribute next. Annie doubtfully suggests a dictionary, and the teacher responds the following:

> "No! Some people could say it's a dictionary of flights, but it is not the word I'm looking for... Think about the <<technological>> side of it... all of that <<information>> ... stored in one place... <<thousands and thousands and thousands>> of flights... all ready for you to look at. And we give that a name... If something has got <<thousands of pieces of information>> in it, that you can search... and it begins with a 'D'" – [Transcript extract 13]

This contribution is again treated as a partial disagreement. The fact that it violates one of the criteria – that is, the word is ten letters long – is not pointed out; effectively, it is enough to say that it is not the word the teacher has in mind. In continuing the task of guessing the whole word, the teacher formulates an account of why 'document', 'director', and 'dictionary' are not the correct answers. She provides a cue: to think about "the technological side of it", the storage of "all that information" "in one place". The technological aspect is revealed as "a place" with the capacity to "store information". The words 'technological', 'information', and 'place' are marked prosodically by uttering them significantly more slowly than the rest of the talk. The teacher stretches the words by prolonging the vowels. This is, interactionally, a common way of attributing a special status to a part of a turn (Mortensen 2011). Miss Hughes is producing a recognisable (for the competent member) definition of database. In doing so she is sharping the semantical and common-sensical criteria to narrow down the options of names – it has to be a name that fits the definition she has just provided – whilst reminding pupils of the applicability of the previous criteria; the word starts with the letter D.

When Tracy, the next pupil is asked to provide an answer, her response is to ask for more information about the word (whether it contains the letter "e" in it). By doing this, the pupil changes the three-turns sequence dynamic as she does not propose a candidate answer. Instead, she requests the confirmation of a new criterion. In doing so she is

enacting the rules of the game the hangman, and not the rules of the game as defined by Miss Hughes; namely, to guess the whole word. However, the teacher answers Tracy's question and this is the catalyst for the closure of the task of making the link, as the next contribution asserts the correct answer:

> "A << database >> Well done! So Skyscanner is a database" – [Transcript extract 14]

So, what we have in the activity of "making the link" is a series of three-turns sequences. Each turn (in particular the second and the third) contribute to the production of explicit and implicit instructions that set up local rules to guide, through *practical reasoning* (Garfinkel 1967b) and *practical operations* (Latour and Woolgar 1979), the lesson towards its objective. One sees that some of the knowledge the participants rely upon consists of assuming, when the teacher or the pupils refer to some object, for example, by naming it, the other knows what they are referring to (even if what the other understands by the naming is never known). When we use names in this way, we depend on the experience others have with the objects in question. Thus, it is the teacher's job to anticipate the pupils' familiarity with the topic, and with the precise name she wants them to utter, and their ability to apply the occasioned interactional rules for producing adequate contributions. Moreover, as Wieder asserts:

> 'When we examine the indeterminate and developing character of the situations that members face when they employ names, it appears that no definite asset of criteria for using names could be stated in any case' (Wieder 1971, p. 134).

Nonetheless, rules are occasioned, and criteria are invoked, and this has practical implications. The point is not what the name is, but how its adequacy is made intelligible to the context and the activity, and this is something one can observe in participants' contributions to the dialogue.

3. Recruiting and evaluating displays of understanding

> "Now then, you may say 'you lost me, I had you at app and website, totally get that' ... << So, what do you think I mean by a database? >> ((a few pupils raise their hands)) If you think about what 'data' is, data is information. And think about that base that Aman visited in our story, where all of the soldiers were staying. << So, a database is a place where all that information is stored >> Anyone else want to have a go at explaining it? ((more pupils raise their hands)) How they think it makes sense in their minds?" – [Transcript extract 15]

With this turn, the teacher initiates a new part of the lesson, which consists of going beyond "making the link" to instruct further how the notion of a 'database' ought to be understood. Firstly, Miss Hughes *takes on* the position of the pupils to elicit a formulation of what she thinks could be a pupils' problem, namely the problem of understanding the meaning of the *use* of the word 'database' in the task of saying what Skyscanner *is*. When she asks them what they think she means, the teacher does not seek any immediate answer, despite the pupils' hands being raised. Miss Hughes is setting up the activity and she has not finished.

She continues by breaking down the word 'database' into two words, 'data' and 'base', and explains these. 'Data' is introduced as synonymous with 'information', and 'base' is explained in reference to a story that they have been reading that she uses as an analogy. A 'base', in the military context of the story, is a *place* where soldiers are. She then repeats the definition of database, "a place where all that information is stored", where "all that" stands for the "thousands of pieces of information" available in Skyscanner that the teacher referred to a few turns before. In sum, Miss Hughes orients the pupils to a *spatial* reference (it is a place), a *functional* reference (to store), and a *content* reference (big quantities of data/information). Thus, although she is not producing explicit rules as in the previous activity, she is occasioning a schema against which pupils can assess their own understanding. Finally, the teacher invites them to share their understanding of how "it makes sense in their minds".

The notion of *objectivation* is of analytical relevance here because the events described next demonstrate that one way in which teachers facilitate *learning* is by instructing pupils to turn their thinking into publicly available objects, and to subject these objects to evaluation and ratification. As Liberman reports, when examining Husserl's (1969; 1970; 1973), Schütz (1973), and Garfinkel's (2006) legacy:

> 'One way by which people learn just-what they mean is to objectivate their notion and then observe what that objectivated notion accomplishes, that is, just-what it comes to mean during the course of their interaction' (Liberman 2018, p. n/a).

When objectivated, these notions acquire a *materiality* that allows them to 'sit there in the spectacle, permitting parties to use them as focal points for their collaborative attention' (Liberman 2018, p. n/a). Objectivation is a practice by which we sometimes perceive reality as objective, independently existent from our perception and understanding, even though we know that is not the case. By these terms, meaning is not private nor subjective, it is not located in our minds, but it is publicly available and methodically achieved through members' actions (Macbeth 2010). Of course, objectivation is just a gloss intended to emphasise the communicative work of producing accounts as *facts*.

The teacher asks Kevin first. Although he had his hand up, which usually means that the pupils are ready to participate, he tentatively asks: "is it like a folder?". The teacher responds:

> "It is! It's like an interactive folder... So, Skyscanner is a big folder of information, where I can go and look through it. But they make it look really nice, and they made it look so I can use it very easily... Anyone else has an idea of what database might mean to them?... I like that, 'a folder'" – [Transcript extract 16]

The teacher's turn reflects a positive evaluation of Kevin's answer confirmed with the statement "it is" (and also at the end when she indicates she likes the idea). Miss Hughes also expands by explaining how Skyscanner (here used as synonymous of 'database') can be seen as "a big [interactive] folder of information". As she has done before, the teacher

reformulates the pupil's answer to give it a *sense* with which she can work and continue adding texture to the lesson. In the educational literature, these kinds of responses are referred to as *colonising* the student's response (Delamont 1983), a strategy to keep control over the situation and the authority over knowledge.

In terms of the referential schema introduced by the teacher, a folder in itself does not contain the spatial reference (it does indirectly, as it is object that occupies a space, even if it is a virtual space), but the teacher integrates this element when rearticulating the pupil's contribution: "is a big folder of information, where I can go and look through it". Here, the use of "where" implies a spatial reference. Additionally, 'folder' clearly evokes the functional and the content references, i.e., a folder is commonly used to store information. In addition, this reformulation allows Miss Hughes to add that Skyscanner has been made to "look really nice" and be used "very easily", which were accounts provided by the pupils at the beginning of the lesson when she asked them to think about why people would use flight searchers such as Skyscanner.

The teacher continues by asking Sion, who also answers with a question: "is it a cloud?", and this time, the teacher's response produces a partial agreement (that we see in the combined used of a disagreement token "but", followed by an agreement marker "yeah") with a corrective element:

> "So, a 'cloud' is when it's a database that is stored through the Internet. It's not saved in your hard drive. So, it would be saved on the Internet. But yeah! Very similar" – [Transcript extract 17]

Miss Hughes corrective turn starts with an explanation of what "a 'cloud' is". The meaning of the word is accepted without question. The teacher unproblematically assumes Sion is referring to an online server and not the meteorological phenomenon. In formulating a definition of what a 'cloud' *is*, she states that clouds are "saved on the internet", not in the hard drive. How this sentence is designed to be heard is that: specifying the place were databases (or similar things) are saved is relevant in task of defining the term. So, a 'cloud' being a database stored on the Internet is articulated as different to the definition of database she has in mind.

One may put into question the *correctness* of the teacher's account. On the one hand, if Skyscanner is a website, then as a 'database' it is also stored on the Internet. On the other, the Internet is a cloud, and clouds require physical infrastructure. In fact, digital clouds have a significant ecological footprint due to the amount of energy that they require to function (Carruth 2014). In addition, the database the class would be building later on is done through Just2Data, which operates through the Internet.

However, what the teacher *has in mind* is a typification – in Schütz's sense (1973) – an ideal notion of a database, which is just a gloss to refer to what the teacher's correction accomplishes – namely, a conceptual boundary between 'cloud' and 'database'. Hence, this inaccuracy is not a mistake or a demonstration of a lack of knowledge on behalf of the teacher, but a simple and practical way of drawing a line between two concepts relevant for the pupils' digital learning. 'Database' and 'cloud' need to be conceptually differentiated. What makes them different is not as relevant – at least at this educational level – as the understanding that they need to be seen as separate lexical items. We saw the display of this strategy in the previous section, when the teacher explains a 'document' is different from a 'database', in that, in the context of their digital learning, 'documents' refer to the files she creates in Google Classroom for them this is despite the fact that in Google Sheets they could also create databases.

What is problematic about the notion of correctness in a *strictest sense* can be seen in these materials, where notions of correctness are intrinsically problematic when seen from the outside but accepted as adequate in the situation of its production. For example, if someone were to say Skyscanner is like a folder, its sense would not necessarily be made straightforwardly, but in the context in which this claim was produced it is made coherent for the purpose of the activity. As Macbeth suggests, '[c]orrect answers are better understood as locally adequate or acceptable answers for the practical purposes at hand, and perhaps this is the "strictest" sense of classroom correction' (Macbeth 2004, p. 722). Lexical objects and their rules of use need to be seen as tied, not only to the context in which they are being used (e.g., a classroom), but the activity of its production, which is ongoingly being worked out in each next turn.

> '[W]e can see how a praxeology of social action underwrites every normative glossary. This is not an account of contingency run wild. It is rather an account of the production of normative order as the work of situated action' (Macbeth 2010, p. 396).

When names (such as 'database', 'folder', 'cloud', and so on) come up, they do so 'only at special places, and those special places operate in particular ways' (Sacks 1995 V. II, p. 37). Hence, the notion used is independent of its coming up (such as the formal definitions that we might find in dictionaries) is not necessarily the notion that comes up at those special places and *vice versa* (e.g., the definition of database produced in this turn). In other words, the notion of 'database' used in each turn is only relevant to the conversational locus of its production, but in which ways it is made relevant is here made a topic of analytical enquiry. This is an argument for a radical *interpretive flexibility*, which does not only link certain interpretation of technological artefacts to particular actors and their contexts, but to unique occasions of verbal and embodied actions in the process of constituting specific social practices.

In analysing these practices, we see that the *correctness* of object of knowledge is a local phenomenon that the parties of the scene orient to. For example, we see the pupils defer to the teacher for the correctness of their answer by formulating it in the form of questions (e.g., "is it like a folder?" or "is it a cloud?"). This observation relates to what Greiffenhagen (2008, p. 32) records in his own study of classroom interaction, when he argues that 'the pupils orient to the fact that their accounts are only *candidate* solutions, which have to be validated by the teacher'. For the teacher, on the other hand, ratification and correction become necessary practical and professional activities for the accomplishment of the *transmission* of knowledge. These exchanges are a form of informal situated assessment, in the sense that the activity is oriented towards checking pupils' understanding of the topic; but they become both an assessment and an occasion of knowledge production.

The production of correct knowledge is here ongoingly pedagogical and oriented to the task of accomplishing a particular kind of lesson, recognisable so for the enactment of certain interactional features (e.g., the three-turn sequence). What I mean by this is that

the teacher's aim is not just to transmit some knowledge, to be memorised, and reproduced by the pupils, but to flesh out occasions to produce nuanced knowledge as a collaborative achievement, even when she holds the last word about what this knowledge should look like. The pupils' contributions (included the *incorrect* ones) provide occasions to add texture to the lesson and to give it the shape of a particular kind of lesson. That is, a lesson that encourage pupils' active involvement and that troubles the understanding of the knowledge being produce (e.g., by questioning the conceptual boundaries and associations of the locally produced definitions).

Producing closure

A pupil is selected to contribute attempts an account but does not finish: "it's like a digital... kind of...mmm", Diana says. The teacher then insinuates she thought Diana was going to say what she was thinking, and the pupil has a second go: "a digital guide?". Then the teacher brings this part of the lesson to a close:

> "Yes! I was going to say a digital library... Now, Skyscanner is a digital library of flights and travel information. But on J2, you can make your own database... ((Miss Hughes points at the 'Database' box figuring in the J2Data menu screened in the whiteboard)) So, now, we're going to do just that" – [Transcript extract 18]

'Digital guide' is ratified positively, but not much more evaluation is offered as the teacher is orienting to the task of closing up this part of the lesson to move on to the next one: demonstrating how to use Just2data to produce a mock-up database. One may infer that the teacher ratification is orienting to the word 'digital', as she then carries it into her own formulation of how to understand Skyscanner as a database. Part of the closure consists of offering an ultimate display of understanding herself, which, by virtue of being provided by the teacher, does not require correction. Through her turn, we see she is proposing that Skyscanner can be seen as "a digital library of flights and travel information". The word 'library' can be easily associated with the three definitional features mentioned before regarding the content, spatial, and functional references. Moreover, the use of the word 'digital' works as a reminder that all of this sensemaking – describing Skyscanner as

a database, a guide, a director, a folder, and so on – is being done in relation to learning about the digital objects.

The class proceeds to the collaborative production of a mock-up database. The teacher recruits ideas from the pupils about what to create a database for and what to include. In doing so, she demonstrates the step-by-step process of how to create a database using Just2Data and explains technical terms such as what 'field' and 'categories' are in the context of databases (e.g., "a 'field' is not what is outside where cows are... when we talk about data, a 'field' is a part of that database, it is a section. so, for example...").

4. Conclusion

This chapter has described, analysed, and discussed an instance in which a Year 6 class was introduced to the concept of a database. The analysis has centred in exhibiting the *lived details* that reflexively constitute classroom-specific-work. Attending to those details methodically makes possible the exploration of the production of subject knowledge as local, practical, and interactional accomplishments. In the case at hand, that is the notion of a 'database', a lexical item present in the DCF, and, therefore, an educational outcome formally sought out. It is in this sense that the analysis has shown curricular enactment in practice. The chapter documents and examines the way teachers and pupils draw upon not only knowledge about specific discursive domains, but also *procedural knowledge* (McHoul and Watson 1984), e.g., how the teacher and the pupils, as incumbents of such categories, are expected to contribute to the dialogue. Therefore, the analysis has focused on the way these *knowledges* are implicated and articulated in the task of producing *correct* subject knowledge *for all practical purposes* (Garfinkel 1967). This is, in a way, the *situated* (Knorr-Cetina 1981) *microsocial phenomena* (Latour and Woolgar 1979) that, to a large extent, forms the everyday activities of teacher and pupils in the classroom and by which understandings of the digital artefacts are accomplished.

The interactions composing the educational encounter described and analysed in this chapter demonstrate the kind of asymmetrical relationship described in the literature[49]. We saw how Miss Hughes's actions are recognisable as those of a 'teacher' and the actions of the pupils are recognisable as those of a cohort of 'pupils'. Observable through these kinds of exchanges, is that the teacher's authority is accomplished as a matter of *practical action* (Macbeth 1991). The teacher enacts her taken-for-granted authority over the learners, carefully monitoring turns (either by naming the children, pointing at them, or directing her gaze at them), evaluates, corrects, and ratifies the children's contributions to facilitate the lesson. This does not mean, however, that this kind of asymmetry is unique to these settings[50], but it is a pervasive feature of school settings, even in situations where the teacher's control over knowledge is at stake, as we will see in Chapter 6. Moreover, this chapter also shows how there is a symmetrical orientation towards emergent contingencies. For example, whereas it is a pupils' concern to understand: (i) what the activity consists of; (ii) to understand what Skyscanner is in relation to the activity the teacher is proposing; and (iii) to understand the cues the teacher is producing in the form of occasioned rules and criteria. It is a teacher's concern to make sure: (i) the pupils understand the activity; (ii) that she is providing sufficient cues to help them produce good answers; and (iii) to understand what pupils know and their developmental level (e.g., their ability to pick up on the cue she is producing). There is, therefore, a mutual accountability shaping the encounter.

Furthermore, by using the term 'occasioned' throughout this chapter, my intention has been to emphasise that features of socially organised activities – such as lessons – are temporally situated and contingent accomplishments of the production and recognition

[49] As it was discussed in the review of the literature, studies of classroom order have described how lessons are organised, interactionally, as 'local organisations of rights, privileges, sequential structure, and practical contingency' (Macbeth 1991, p. 285). The interactional system described in these studies is characterised by an asymmetric distribution of conversational rights in which the teacher controls *every* aspect of the conversation: turn-taking, topic choice and duration, and definition of what has been said for all practical purposes (Paoletti and Fele 2004).

[50] A *perspicuous setting* for this kind of asymmetry is also found in doctor-patient' interactions (e.g., Strong 1979; ten Haven 1991), among other institutional settings (see Drew and Heritage 1992, p. 47-53).

work of parties to the activity (Zimmerman and Pollner 1971, p. 94). Therefore, occasioned rules and criteria are not conceived here to be standing prior to and independent of the occasion in which they are being displayed and recognised. One of the main interactional features of this encounter – in which rules and criteria are occasioned – is the presence of the three-turn sequences by which the teacher guides a pedagogical dialogue. The dialogue is conducted systematically. The teacher asks either the cohort of students or a single student a question, they provide an answer, and the teacher comments on the pupils' answer. For the task of "making the link", the pupils' responses (i.e., the production of candidate answers for *naming* Skyscanner) actively shape the unfolding of the dialogue as the teacher's evaluations to these contributions bring forward the application of a series of occasioned rules. These are locally enacted rules for producing *good* and *good enough* contributions that deal with the problem of infinite possible candidate names.

The teacher sets up a framework by which pupils' actions can be assessed against. The rules assembling this interpretive framework are rules in-action. They are activated by the participants in dealing with the task at hand and with its emerging contingencies. They are indexical expressions, 'whose definite sense and meaning are tied to the occasions of their production and use' (Macbeth 2010, p. 396). In this occasion, they function as a set of logical grammars that connect and disconnect 'database' with other concepts (such as 'clouds', 'folders', 'documents', etc.). For example, Skyscanner is a semantically related to the noun 'database', but it is not a with the adjective 'interesting'. This does not occur in any universal sense, but according to the locally formulated rules for the practical accomplishment of the activity of making the *link*. If rules are broken, participants are sanctioned. Following these methods, eventually the term 'database', as the *correct* name for Skyscanner – as established by the teacher – is made discoverable through the dialogue.

This chapter also examined the way the intelligibility of the students' actions is subject to scrutiny on behalf of the teacher, as well as the pedagogical function of the teacher's *corrections*. Whereas corrections in other interactional situations have a function often associated to some sort of repair, in educational settings, they are strongly tied to

accountable pedagogical aims. Delamont (1983, p. 51) argues that the teacher's 'most potent resource' is in fact 'her possession of, access to, and control over knowledge. She has knowledge and she defines what should and should not be learnt'. This control over knowledge often translates into the imposition of a particular interpretative framework that makes intelligible the perceived world in certain ways. As Mackay argued, '[i]nstruction is the occasion for adults to exercise their preference for a certain meaning of the world for the child' (Mackay 1974, p. 186).

The notion of a 'database' is then introduced through establishing an association between the *term* and a *real-life* example, Skyscanner (an online flights search engine). Then, the teacher offers a typification – i.e., the term is explained by crafting a description of an ideal type – and asks the pupils to objectivate their understanding. These objectivations enable pupils to engage in a conceptual exercise. At times, other concepts are used to make sense of (working as analogies, e.g., folder and library), and other times they are used to establish conceptual boundaries (e.g., document and cloud). A finding of this discussion is that the accomplishment of *understanding* as a publicly available object that allows the teacher to move the pedagogical dialogue to achieve the educational outcome. Practically, they are the means by which the teacher inserts corrections that add texture to the lesson; thus, articulating further understanding of the term 'databases'. The pupils contributions, in adding texture, constitute the lesson in itself, i.e., this kind of lesson is not possible without the pupils' participations.

The production of digital objects (such as a database) as objects of knowledge for educational purposes is accomplished through interactional methods well-established in educational settings. Therefore, this analysis demonstrates how – despite the fact that the DCF comes along as part of a reform that symbolises radically different ways of doing education – teaching is, in many ways, *business as usual*. What we find is that – when it comes to identifying method for accomplishing the teaching of vocabulary, concepts, or terms, in a primary school classroom – *the digital*, as a subject of knowledge, is interchangeable with other domains of knowledge. Miss Hughes could be teaching about any other topic and the classroom interaction would have taken a very similar shape.

The task of developing an understanding comes to an end as the teacher initiates a new activity: making a database in Just2Data, which brings database, from the world of the ideas down to a hands-on task; the actual production of a database. This is to say, she produces instructions into an ICT activity for the purpose of developing skills through the creation digital objects, which is the topic of the next chapter.

Chapter 5: Instructions for the 'competent' use of a software suite

> 'All practical teachers know that education is a patient process of mastery of details, minute by minute, hour by hour, day by day' (Whitehead 2018 [1916], p. 7)

Having shown in Chapter 4 how a variety of *knowledges* are implicated, articulated, and objectivated in the task of producing *correct* subject knowledge about digital objects, in this chapter, I examine the detail of what is practically involved in the teaching of digital skills. Teaching digital skills is the number one objective of the DCF. The premise is that these skills will make learners become 'confident users of a range of technologies to help them function and communicate effectively and make sense of the world' (Welsh Government 2022). This competency is conceived as paramount for citizens to thrive in the contemporary world.

In this chapter, I look at instruction and analyse how these pedagogical communicative expressions are organised and mobilised to set tasks designed for making pupils become confident users of technology. Guiding this analysis are three main empirical questions: (i) *How are instructions crafted so that they enact the DCF purposes?* (ii) *How do instructions exhibit objectivated predicates of digital competency?* And (iii) *how would instructions on ICT independent learning activities have to be produced to prove practically adequate?*

The chapter demonstrates how a local understanding of digital competency is re-constructable through the instructions provided for that task, with that class, at that point in time. It also documents how, in providing *in vivo* instructions, the teacher assumes shared knowledge of all sorts (e.g., substantive, interactional, and embodied). Indeed, the task of assuming these knowledges *right* is a teacher's work; if they fail, problems arise. In this sense, I examine the level of instructional detail that is made practically necessary to make instructible each step of the activity, with the resources at hand. In particular, I detail the procedures by which tacit embodied knowledge is made available and re-

constructable for the pupils, and the uses of digital technology in accomplishing this reconstruction. I detail technology as it is actually used – 'rather than abstract and theoretical notions of how it might or should be used' (Birmingham *et al.*, 2022). I address questions such as: (iv) *What is the teacher doing with the software as she instructs on its use?* (v) *How does the software and its features shape the instructions?* And, in turn, (vi) *how do instructions shape a particular view of the software and its features?* In answering these questions, I again draw on previous ethnomethodological and conversational analysis work on education (e.g., Payne and Cuff 1982; Watson 1992; Hester and Francis 2000), and particularly on Garfinkel's (2002, chap 6) work on instruction and instructed action and subsequent works.

The chapter is organised around the chronological unfolding of the instructional sequence of an ICT independent learning activity. The first section provides ethnographic details of the occasion, which are explored throughout the rest of the chapter. It also uses the beginning of the lesson as an occasion to introduce *indexicality* as an essential property of instructions. A second section describes and analyses the procedures enacted by the participants to accomplish the task of instructing the activity. This involves the verbal formulation of operable steps and the enactment of those steps as collaborative accomplishments. A third section examines the way the activity is embedded in a wider educational scheme, by which digital skills are not developed in isolation but in the context of other pedagogical activities. Finally, some reflections are provided as concluding remarks to the chapter.

1. Instructing on the use of Google Docs to create digital content

In the following pages, I discuss a classroom interaction that took place on a Tuesday afternoon of the Autumn term in a Year 4 class. The question guiding the class enquiry of that term was whether zoos should be banned, and for that afternoon, Mrs Davies, the teacher, had planned a carousel of three activities: (1) a teacher-focused group working on the tables at the centre of the classroom, gathering information about the six most endangered animals in their Inquiry books; (2) a group in the studio area outside of the classroom classifying types of animals with the TA (Teacher Assistant); and (3) a group

doing an independent learning activity on the computers at the back of the classroom. The activity consisted of creating a digital list of 'pros and cons of using animals for entertainment purposes' using Google Docs[51].

Before sending the groups to the different carousel designated areas, the teacher introduced to the whole class the topic of the independent learning activity with a brief discussion about using animals for entertainment. The teacher asked them to think of some examples. The group mentioned a few (e.g., circus, YouTube videos, "try not to laugh" clips, racing and fighting) and discussed others (e.g., whether racing is fair for the horses, and what happens when they get injured). From here, she provided a four-minute instruction on how to create a digital list of pros and cons in Google Docs and made pupils co-instructors and co-demonstrators. The description and analysis of these instructions are this chapter's focus.

Through this case, I examine how digital skills are formally developed in the classroom. The educational task of using Google Docs to create a list of pros and cons can be seen as aligning with the DCF strand of *Producing* which encompasses activities such as 'planning (including searching for and sourcing information), creating, evaluating, and refining digital content' (Welsh Government n/d a). In particular, the task at hand can be located within the Progression Step 1 of the element *Creating digital content*, i.e., creating simple digital work competently. In sum, what follows is a demonstration of an instance of classroom interaction in which the teacher instructs in an activity that involves the experience of creating simple digital content using Google Docs.

[51] Google Docs is an online word processor available to schools through Google Workspace for Education, a package of cloud-based services that provide Welsh schools with a variety of tools to work online. The suite includes an online 'classroom', where teachers can set up a 'class', create and assess assignments, share announcements, and address questions raised through the class 'stream'. The packages also include tools such as Google Sheets and Google Slides, among others. The integration of the software suite to Hwb in 2017 was the result of feedback from schools who were already using the software through their personal accounts. This made Wales the first government the UK to have a direct service contract with Google to provide their service throughout the country, which also included a deal for equipping schools with Chromebook devices.

Beginning instructions

In the scene, we find Mrs Davies, the teacher, sitting on a stool by a shelf unit, which she often uses as a desk. She tends to place her laptop there when, as on this occasion, she has to project something on a bigger screen. On these occasions, she plugs her laptop into a HDMI cable and connects it to the LG TV screen hanging on the wall. Facing her and the screen is a group of 30 children seated on the carpeted floor. She gazes towards the cohort of pupils and initiates a sequence of turns recognisable as the beginning of a lesson:

> "Well, this afternoon... I want you to use all these examples, this afternoon... And you are going to use ((the teacher turns her body around towards the laptop, gazing up towards the TV screen)) Google Docs... We looked at it yesterday... We looked at going into Hwb, using Google Docs" – [Transcript extract 19]

We can recognise this first turn as an introduction to the lesson because elements of what constitutes the usual start of a lesson are observable here. Mrs Davies gazes at the cohort of students and hints the start of a lesson with a marker ("well"), a situational reference ("this afternoon"), and formulates an instructional utterance ("I want you to use all these examples", in which "these" stands for the examples of using animals for entertainment which they had just been discussing). This formulation introduces the ICT activity in relation to a wider set of lessons the class have been having on the enquiry theme ('Should zoos be banned?'), but also on the use of Google Docs ("we looked at it yesterday"). Therefore, it is not a free-standing' ICT lesson, but part of a whole series of lessons. Moreover, as with the lesson on databases (Chapter 4), part of introducing an activity entails reminding the class what they have done before. "We looked at going into Hwb" and "using Google Docs". By doing this, the teacher points at the previously *acquired* knowledge she reasonably assumes pupils have regarding what it is involved in accomplishing the activities *going* into Hwb and *using* Google Docs. This does not indicate they are expected to be experts of some sort, but at least they have some familiarity with these activities already, i.e., this is not the first time. Here, again, the history of the class is referenced for making the group of students accountable.

Furthermore, it comes as no surprise that instructions in the classroom are highly indexical. Drawing from Husserl's (1943, pp. 237-238) work, Garfinkel described indexical expressions as:

> '[E]xpressions whose sense cannot be decided by an auditor without [their] necessarily knowing or assuming something about the biography and the purpose of the use of the expression, to circumstances of the utterance, the previous course of the conversation, or the particular relationship of actual or potential interaction that exists between the expressor and the auditor' (Garfinkel 1967, p. 4).

That expressions such as "we looked at it yesterday" are highly indexical and as such do not only show there is a relationship between this lesson and others, but by specifying that, to an extent, this is something pupils have already seen, the teacher establishes common grounds from which to build the instructions that will follow. This observation shows that, as part of their everyday practice, teachers assume learners can reconstruct the indexical work that glosses such as "what we did yesterday" accomplishes. Teachers can rely on some stock of shared knowledge, although teachers can only do so for *all practical purposes*, as Garfinkel (2002) would say. The teacher, however, needs to assume pupils share more than just *that* knowledge. As shown in Chapter 4, teachers heavily and unavoidably rely on, for example, pupils' interpretive procedures.

> 'In order to recognise an instructional speech activity as different from other kinds of speech situations, the child will have to know some of the adult expectations and conventions for recognising instructional language, and will have begun to contextualise the stream of activity' (Cook-Gumperz 1977, p. 111).

So, for example, when the teacher formulates an utterance such as "you are going to use Google Docs", she is assuming the pupils can identify the expression as an instruction, and then (or in due time) will proceed to perform (or attempt to perform) the instructed action of *using* Google Docs.

In contextualising a stream of activity, pupils need to be able to recognise *who* is performing such activity. By 'who', I do not necessarily mean which individual, but which kinds of person is doing such action. The categorisation of kinds is a sensemaking mechanism members routinely rely upon. Categories are, as Sacks (1992) would say, *inference rich*:

> '[A] great deal of the knowledge that members of a society have about the society is stored in terms of these categories [...] a vast amount of stuff is handled by Members in terms of the categories that it locates and the way it locates them, and the activities that those categories are used to handle' (Sacks 1992, Vol I, Lecture 6, p. 40-41).

With reference to educational phenomena, Hester and Francis (2000) argue that the definition of an educational situation can be defined as a matter of routine, local relevance. This is to say, we need to look at members' activities and then consider the ways in which these activities are constituted as much as they are constitutive of a particular setting. This is the ethnomethodological *reflexivity* (Lynch 2000) and, in the context of studying formal educational settings, this means a classroom is not a pedagogical setting *per se*, as 'settings do not stand ready-made and pre-defined but are made-up *in situ* by the same practices which make them accountable to the members' (Fox 2006, p. 439). In other words, because people in the classroom act in way that is recognisable and discernible as the plausible interactions of the participants of a class – as 'teachers' and 'students' – the classroom is situationally assembled as a pedagogical setting (Maeder 2018):

> 'Teachers, for example, establish their credentials as incumbents of such a category through the production of particular sorts of sequentially positioned utterances, just as their utterances trade off a presumed social identity (as teachers) for their accountable production and recognition' (Hester and Eglin 1997, p. 2).

In short, the argument here is that we can assume pupils see the instructions as instructions, partially, because they are being produced by a successful incumbent of the

category 'teacher', and *vice versa*. For instance, we see the Mrs Davies is a teacher as she initiates the lesson and produces activity instructions.

2. Teachers, pupils, and technology

> "So, you go into your Hwb page, click on Google for Education ((the TV screen goes blank)) ... I'm gonna get somebody from here now to come and show me... rather than me showing you ((pupils raise their hands eagerly and ask to be chosen as 'instructors', e.g., they shout "I" or "me me")) ((Google Classroom menu opens up in the screen)) going into this... ((the 'waffle' opens up in the screen)) click... we click on 'Docs' ((the screen goes blank again))" – [Transcript extract 20]

With the Hwb page open, which pupils can see on the TV screen, the teacher articulates a series of steps on how to accomplish the first part of the activity, i.e., how to access a blank digital document where they will create a list of pros and cons of using animals for entertainment. The teacher starts her turn with the marker "so" and follows with a couple of directives "you go into your Hwb page, click on Google for Education". Thus, instructions are produced as a set of operations on *how to get there*, from a starting point (the Hwb main page) to a destination (a blank Google document). *Sequencing* a task (Greiffenhagen 2008) – i.e., breaking it down into a number of steps – is an everyday life phenomenon. It is a method used, not only for the formal instruction of an educational activity, but any time anyone might face a big or complicated task; 'one way to tackle it is by imposing a sequential structure onto it' (Greiffenhagen 2008, p. 26). Thus, the teacher is drawing upon a common procedure to accomplish a task, i.e., breaking it into *operable steps*. First, they must *go* into Hwb and then, they need to *click* on Google for Education.

Halfway through the teacher's formulation of operable steps, the teacher interrupts herself, to formulate a different kind of instruction, "somebody... come and show me",

she says. The interruption of this instruction can be seen as a *bracket*[52] within her instructing sequence. By this I mean the enactment of an action (or sequence of actions) that intersects an already ongoing sequence of actions, which is resumed once the bracket is closed. This bracketing is not casual or incidental. It occurs at the same time the demonstration stops due to the time it takes for the next window to open. This synchronicity evidences a relationship between the rhythm and trajectory of the teacher's instruction/demonstration and the technological conditions in which the instructed actions are embedded. In this instance, more concretely I am talking about the broadband speed (or the speed that the laptop's operative system enables). An observation is, therefore, that instructions can be intersected with brackets in coordination with the temporality produced by the performance of the technology in use. In other words, material conditions affect the pace of instructions and demonstrations, and coordinating these temporalities is a skilful task.

Additionally, there is another sense in which this bracketing is not incidental, but an essential part of instructing on *using* Google Docs for that particular class, in that particular session. Because the class has not only used this online word processor before, but on the previous day pupils received similar instructions, getting pupils to do demonstrations becomes an essential part of the teacher' pedagogical strategy. As we will see later, these demonstrations – in a similar fashion as the displays of understanding shown in Chapter 4 – *objectivate* pupils' understandings and allow for repair in the form of corrections, whilst offering opportunities to add texture to the lesson. Moreover, getting pupils to show their acquired skills and demonstrate their understanding of previous instructions involves them actively in the instructional practices. The expectation shifts from pupils as passive listeners to pupils as potential active instructors/demonstrators, which is a way of enacting pedagogical principles advocated in the curriculum. Pupils

[52] The notion of *bracket* I use here resonates with Garfinkel's (1967) notion of *breach* and with the phenomenological *bracketing* found in Husserl (1931), which referrers to the typification or conception of a phenomenon. I ground the notion of *bracketing* in the idea that social actions are intrinsically and intelligibly ordered. Anything that disrupts such actions has the potential to reveal the work that the actions were doing in creating a coherent and patterned appearance of reality.

respond to this enthusiastically and, by raising their hands and making noises, they attempt to propose themselves as potential candidates to perform these next actions.

Following the closure of this bracket, we observe Mrs Davies reorienting her body towards the computer to resume the instruction and demonstration of the operable steps to *get to* a blank Google document. Clicking over Google for Education takes the teacher to her Google Classroom. Then she instructs: "going onto this", where "this" refers to a small figure in the top righthand of the page (nine dots arranged in a squared form) referred to as the 'waffle' in other instructional occasions. When she clicks on the waffle, a new smaller window opens displaying Google for Education's apps menu. Mrs Davies clicks on 'Docs', whilst verbally instructing this action: "we click on 'Docs'". Here, we see that in producing operable steps, the teacher again mobilises a variety of indexical expressions, for example, using deictic references such as "going onto this" require one to know the exact position of the arrow in the screen. Pupils are expected to be able to reconstruct these indexical expressions. The combination of these simple operable steps and enacted demonstrations can be seen to be building up instructions to seeing a virtual setting as a kind of *gestalt contexture* (Garfinkel 1967; Wider 1974); an ordered, coherent, and patterned fraction of reality, which pupils will have to navigate to complete their activities.

Whilst the teacher articulates this set of operations, she also shows visually how to do it. As such, the activity is not only instructed but demonstrated, giving hearable instructions a 'different and lively sense' (Garfinkel 2002, p. 200). This is because hearing instructions does not necessarily require pupils to think about what following the instructions may actually entail. Moreover, as instructions show indexical properties, following instructions pose problems of clarity, consistency, completeness, followability, factual adequacy (Garfinkel 2002, pp. 191-218). Only in following them can we repair the ambiguity, incompleteness, and adequacy of instructions as an endogenous achievement of practical actions. Following instructions (and in this case, demonstrating the followability of instructions) 'makes up the practical, local, occasioned work that turns the [instructions] into a description, (a descriptive account) of the in-course, *in vivo* work of following them' (Garfinkel 2002, p. 200). I argue, by demonstrating the followability of her the instruction, *that* is what Mrs Davies is doing; she is producing an *in vivo* and embodied account of

how to follow her instructions. In accomplishing this, the TV screen becomes an essential resource. Through the screen, she can make available a perceptual or *phenomenal field* (Gurwitsch 1964; Garfinkel 2002) that becomes essential for the sensemaking and followability of the instructions. The millimetric movements of the teacher's hand over the laptop's touchpad are mirrored by the virtual movements represented by the arrow-moving-figure in the screen. Each 'click' that brings up the display of a new page is choreographed along with the articulation of a new step in these set of operations.

Producing these instructions requires assuming pupils understand what the teacher does with the laptop and how the teacher's embodied actions affect what is displayed on the TV screen. These observations show that teaching, instructing, and demonstrating digital skills bears similarities with craft knowledge (Stukenbrock 2014), artistic performance (Sudnow 1978; Weeks 1996; Nishizaka 2006; Reed *et al.* 2013; Tolins 2013), and sporting prowess (Wacquant 2004; Delamont and Stephens 2008; Lindwall and Ekstrom 2012; Evans and Reynolds 2016). In other words, it depends on practical embodied knowledge. As Evans and Lindwall noted:

> 'In contexts of instruction in embodied practical activities where the cultivation of proficient embodied skill comprises the chief focus of instructional activity, demonstrations constitute a central pedagogical resource' (Evans and Lindwall 2020, p. 223).

As Suchman (2000) and Myers (2008) noted in their studies, screen work is largely embodied, involving not just looking, but touching, moving, and gripping. Similarly, we see here that *technique* is applied to the body (see Mauss 1973, 2006) in manipulating the technology. However, the application of such technique is not made subject to verbal instruction. In this sense, it is worth noting that not only the way the computer works is *blackboxed* or made invisible by its own success (Latour 1987), but the way the teacher's actions (physically enacting the demonstration) work over the computer is also *blackboxed*. In other words, pupils have access to the verbal instructions (the input) and the product of the teacher's instructed actions on the screen (the output), but not the actual details of such embodied actions (the process). Pupils cannot see the laptop's keyboard and touchpad or what the teacher does with them. Instead, pupils have to rely

on what the TV screen shows them as the description of the instructed actions. However, this apparent contingency is not treated as a problem, but it is built into the instructional strategy. In other words, in this occasion, *this* box does not need to be open for instructions to be practically followable.

My argument here is that the details of the phenomenal field that the TV screen makes available, prove enough to reconstruct the achieved coherence of embodied jobs. These are reconstructable details of position, placement, distance, and movement that provide for an embodied account of the practical activities and jobs of the body – bodies that are skilled in ways of doing mundane tasks, such as moving the arrow in the screen. Thus, the teacher can assume the pupils either have the embodied experience or can work out *on the go* how fingers and touchpads work together to accomplish movement in the screen. These aspects of competence or performance are often described in terms of embodied *tacit* knowledge (Polanyi 1958). As discussed in the review of the literature, this is conventionally taken to refer to the fact that there are some activities that cannot be explicitly taught – or at least are not made objects of instruction. The acquisition of this kind of knowledge is experiential, accomplished through observation, mimicry, and repetition (Delamont and Atkinson 2018).

Producing next steps collaboratively

> "And who can show me what do I need to do in Google Docs? ((the teacher stands up, adjusts her blouse, and gives a step forward towards the cohort of pupils)) Who can remember? Who can tell me? ((the pupils have their hands raised, eager to be chosen, some pupils attempt to propose next steps))" – [Transcript extract 21]

After concluding the verbal directions on how to get to a blank document, and whilst Google Docs is still loading, Mrs Davies stands up and initiates a new turn: "who can show me what do I need to do in Google Docs?". Immediately after, the teacher orients her body towards the class, and reformulates the request: "who can remember? Who can tell me?"; an invitation for pupils to nominate themselves as next instructors/demonstrators. In addition, standing up is a symbolic and a practical move,

Miss Davies is creating space by the laptop to be occupied by the next demonstrator. This gesture projects the nature of the new sequence, namely a pupil-produced instruction/demonstration. Pupils react to this combination of verbal and embodied actions by raising their hands and producing failed attempts at remembering (e.g., "Ahh, is that? Ahh..."). None of them actually produce a turn that is picked up by the teacher.

The teacher scans the group of pupils and picks Frank as the candidate instructor. The group of pupils go quiet and those who had their hands up bring them down. The teacher reiterates the question, "Frank, what do we need to do in Google Docs?". By this time a blank document is already opened on the screen, and Frank produces the following instruction:

> "First, what we're doing... you type in... umm... 'should animals be used for entertainment?'" – [Transcript extract 22]

From Frank's contribution, it worth noting at least two features. First, Frank defers to the teacher for the correctness of his answer by formulating his instruction in the form of a question. We saw, in Chapter 4, that this is a common feature of pupils' responses to questions-with-known-answer formulated by the teacher, and this is a reflexive feature of the interactional asymmetry between teacher and pupils in classroom settings. Second, Frank's formulation exhibits details that allow the identification of his contribution as the formulation of recognisable instructions. As the teacher had done before, Frank also sequences the task, and we see this when he nominates a first action ("first, what we're doing... type in"). Then, he proposes the content of the action, i.e., *what* to type in. The teacher treats Frank's turn as a correct formulation of a next step, and we see this in her next turn:

> "Excellent! We need a title first: 'Should animals be used for entertainment purposes'?" ((the teacher turns around and leans towards the laptop)) – [Transcript extract 23]

We see the teacher evaluates Frank's contribution positively, qualifying it as "excellent". Mrs Davies recognises that Frank's contribution is a valid instruction and what he proposes as next step is the inclusion of a title. The meaning the teacher gives to Frank's

contribution is accounted for when she confirms that they "need a title first". In the teacher's ratification, we see Frank's success at accomplishing the task of providing a *pupil-produced instruction*. Even, if his instruction is slightly modified by the teacher, who adds the word "purposes" at the end of the suggested title. As noted in Chapter 4, the *colonisation* of pupils contributions is as a pervasive feature of the pedagogical three-turn sequence between teacher and students; a strategy for teachers to keep control over the situation and authority over the knowledge (Delamont 1983). Here, I argue these types of corrections also have the practical purpose of providing for accurate instructional detail (e.g., getting the title of the activity right).

Despite initially requesting candidate pupils to "come and show", the teacher does not pursue a request for demonstration further. Instead, on her next turn, Mrs Davies accounts for her taking over the task of demonstrating:

> "I will write that as our title and then somebody else come and do the next bit... ((the teacher starts typing)) 'should animals... ((children chatter among themselves)) should animals be used for... entertainment purposes" – [Transcript extract 24]

In this turn, Mrs Davies accounts for her next action; namely, typing in the title, which pupils can see on the TV screen. The teacher also smoothly postpones the activity of a pupil's demonstration by accounting for a sequenced order of actions ("I will write that as our title and then somebody else come and do the next bit"). Thereby, typing in is not made the object of a pupil-produced instructed demonstration. This may be because typing is also an embodied tacit skill of the kind one learns by doing it and bodily familiarising oneself with a sense of *place* and *distance* within the keyboard[53], not by being told how to do it[54]. Its tacit nature can be seen in that it would prove impractical to put the

[53] This is similar to what Sudnow (1978) reported in his study of embodied knowledge in piano performance.

[54] This resembles boxing coach Deedee's insistence that boxing movements cannot be learnt in books: 'You don't get no sense of *movement*. Boxin's movement, it's the movement that count' (Wacquant 2004, pp. 100-102, emphasis on original). Similarly, typing *movement* is learn by practice.

embodied action of typing the title into detailed operable steps. Instead, the teacher glosses over the articulation of the operability of the steps by reading aloud what she is typing as she is typing it. Reading what she is writing is treated as instructible enough, i.e., the teacher can assume, based on the experience that pupils already have with typing, they are able to reconstruct the details of her actions. Moreover, reading whilst typing, helps children orient their attention to the product of the teacher's actions, although not necessarily all of the pupils do. Some of the children orient their attention towards something else (e.g., chatting among themselves). Considering some of them had done the activity on the previous day, it is reasonable – and perhaps expectable – to imagine some disengagement from some of the pupils.

Furthermore, in typing in the title, the teacher is following the instructions Frank produced. By doing this, one could argue the teacher temporarily shifts roles with the pupils; Frank becomes the 'instructor' and Mrs Davies the 'instructed'. Thus, although a classroom scene is staffed by incumbents of various *setting-appropriate* categories (Jayyusi 1984) such as 'teacher' and 'pupil', there are also *turn-produced* categories (Watson 2015). The incumbency of such categories is sequentially determined. For example, who occupies the turn-formed category 'instructor' is fulfilled by the person who performs the action of instructing. These categories are occupied only by the duration of the sequential action and can lead straight to new turn-formatted category on every new turn. These different levels in which categorial work gets done is what some authors have referred to as the *multi-layered* nature of categorical work (Fitzgerald and Housley 2015). On this occasion, however, these turn-produced categories emerge through the teacher's enactment of her category bounded activities. In other words, this is a pedagogical inversion designed to enable the pupil to display understanding, which – similarly to the questions-with-known-answer – is ultimately subject to the teacher's evaluation, as the last sequence proves[55].

[55] The *proof procedure* (Sacks *et al.* 1974) is an analytical resource members rely on to make sense of other's actions. It consists of seeing what a turn at talk is *doing* by analysing the way it is responded to by the next speaker in their next turn.

Despite the apparent inversion of the categories 'instructor' and 'instructed', participants provide *hints* (Sacks 1992 Vol. I, p. 595) that subtly invoke and display their 'teacher' and 'pupils' categorial incumbency and status. In other words, 'teachers and pupils can have themselves recognisable as such by display the features of their rights, obligations, and expectations' (Payne 1976, p. 36). The activities of the teacher – for example, the requesting next actions and evaluating pupils' turns – are specifically designed in such a way that reflexively projects the instructional activity. That is, the teacher's actions get done in such a way that they are see-able by the children both as being done by a teacher in a classroom but, also, as oriented to the activity of instructing a task – even when she is making pupils co-instructors. In other words, in analysing this classroom interaction, the role and status-set pertaining in the classroom and how they structure the organisation of the activity, the group dynamics and participatory framework involved, are unavoidable. This observation was gestured at in Chapter 4 and is further addressed in Chapter 6.

Reading software features

As the teacher finishes typing the title, some of the pupils anticipate the teacher's next actions and start raising their hands to propose themselves as candidate instructors/demonstrators – first one, followed by a few others. However, as Mrs Davies finishes typing and whilst she is still leaning towards the laptop, she starts a new turn:

> "Right ((children go quieter and some of them bring their hands up again)) if you remember ((the teacher turns to face the cohort of pupils)) I told you yesterday you can change ((the teacher sits on the stool again and redirects her attention back to the laptop)) the size of the font, to whatever size you want... you can ... make it bold, you can underline it, you can change the colour ((the teacher positions the arrow over the menu where these options are)) you know how to do all that" – [Transcript extract 25]

The first thing to notice is that this turn is not formulated as an explicit directive, but as a reminder of what the pupils already know. Editing text is stipulated as a digital skill in the

Creating digital content element of the DCF's *Producing* strand[56]. Thus, although editing the text is not set up to be an essential requirement of the task, pupils are expected to display the digital skills they have already been introduced to. In this sense, digital skills are treated as a scaffold of competency.

Moreover, the teacher initiates this new turn and – without separating her hand from the keyboard – turns her face towards the children to list things pupils have previously learned to do with text in Google Docs (e.g., how to change the size of the font, use the bold option, underline the text, change the colour, and so on). As the teacher is listing the features Google Docs offers for formatting text, she follows the layout of the interface from left to right with the arrow. She goes through some of the options and edits the title as she goes along. In this sense, the software features are *read* – and thus *interpreted* (Grint and Woolgar 1997) – by the teacher. But in being read, the software features appear as emergent, occasioned, and are made *perspicuous* for instructional purposes. That is: they are accomplished as the haecceities of 'some local gang's work affairs' (Garfinkel 2002, p. 182). To paraphrase Garfinkel (2002, p. 99), software feature become just these things, just there, just then, just them, with just what the classroom members have at hand, in just the time that they have, in and with just what they can make of over the course of the instructions.

In addition, the teacher administers the demonstration of each feature *in vivo* as the endogenous in-course existence of an order, in and as a coherence and cogency of software layout (Vertesi 2019). By these means, both instructions and software features come to be reflexively constituted through each other through and for the practical accomplishment of this lesson. That is to say, the software *affordances* (Gibson 1979) become relevant through their instructions, and the instructions are sequenced mirroring the visual order found in the phenomenal field of the software layout.

This observation could be seen to support the idea that technology has no inherent qualities and that the interpretative work that humans engage in establishes what artefacts

[56] Element description available at: https://hwb.gov.wales/curriculum-for-wales/cross-curricular-skills-frameworks/digital-competence-framework (last accessed on March 28th 2023).

actually are (see Grint and Woolgar 1992, 1997; Woolgar and Cooper 1999). From this perspective, what we encounter as 'digital technology' (in this case the word-processor programme) can be understood as 'simply the outcome of interpretive accounts' (Selwyn 2012, p. 86). As discourse is indexical and therefore requires some levels of interpretation, the intelligibility of *the digital* as a discursive phenomenon is always tied to an interpretative work. However, the properties that are integrated into the construction of the instructions are not *fabricated* out of thin air, but out of the publicly perceptually available elements of Google Docs projected in the screen. Elements that have been designed to be found and used by users of the software. Therefore, although an account of the use of the technology in the classroom cannot presuppose inherent qualities, it is important to recognise that whatever interpretation may be produced *in situ* is tied to the material and virtual features of the technology as a matter of culturally patterned shared and recognisable knowledge. That is to say, members can presuppose that other members possess shared methods for locating and objectivating these features.

Demonstrating software use

After reminding the students how text can be formatted in Google Docs, Mrs Davies asks the class to formulate a next step and invites pupils to volunteer as demonstrators:

> "Then, what do we need to do? ((the teacher stands up and looks at the cohort of students)) Who can come and show us what we need to do next? ((the pupils raise their hands and attempt to proposition next steps)) – [Transcript extract 26]

For this next sequence of instructions, the teacher resumes the participatory framework by which she gets students to participate in the formulation of instructions. Mrs Davies first utters a question ("what do we need to do?") and then a request for action ("Who can come and show us what we need to do next?"), both directed to the whole class. The request, again, is a call for pupils to self-nominate as next speakers to formulate a correct next step, but also to execute them. Children, in response, react to this request by raising their hands and – among other things – attempting to produce next turns. As a reminder, this activity had already been taught the day before, and so it is reasonable to assume that

pupils (or at least some of them) can anticipate possible adequate next steps. Again, the teacher's request for next action is not produced *out of the blue*, but it is embedded in this class's specific history of instructions and lessons.

Among the group of self-proclaimed candidates, the teacher chooses Conor, and asks him: "Conor, what do we need to do next?". The pupils lower their hands and go quiet. Conor formulates as next action: to "add a table". We see the adequacy of his reply in the teacher's repetition of the response, although modifying it:

> "Insert a table" ((the teacher looks at the TV screen and then gaze back to Conor)) How can we do that? Come and show me" – [Transcript extract 27]

Mrs Davies substitutes "insert" for "add". 'Insert' is the word that appears in Google Docs. As highlighted above and in Chapter 4, these kinds of corrections are an important part of the instructional work of the teacher. In this case, identifying the relevant vocabulary for the use of the software produces a more accurate directive. By pointing at the correct vocabulary, the teacher makes relevant a stable referential element that pupils will find in the phenomenal field made available through the screen. Subsequently, this correction facilitates the task of following instructions.

With the adequate next step agreed, the teacher asks Conor to enact the demonstration, thereby attempting to initiate the completion of the activity formulated at the beginning of the class ("I'm gonna get somebody from here to come and show me"). On a previous turn, Mrs Davies attempted a pupil-enacted demonstration, but although Frank suggested an adequate next action (to type a title), it was the teacher who did the demonstration. The fact that the teacher did not request Frank to demonstrate might indicate that Frank's contribution was accidentally correct, and that inserting a table is, in fact, the instruction Mrs Davies has been waiting for to request a pupil's demonstration. Inserting the table is, in this sense, the instructional crux of the activity in this particular occasion. This is the occasion in which more instructional resources are deployed.

This time, when directing the question to Conor, Mrs Davies breaks down the question into two turns: "what do we need to do next?" and "how can we do that?". Having answered adequately to the first question, Conor turns down the teacher's request for

demonstration by claiming he has forgotten. Turning down the opportunity to demonstrate the task is seen by the rest of the pupils as an occasion to nominate themselves as the next participants. Consequently, some pupils raise their hands and, again – among other things – attempt to produce next turns. Mrs Davies takes a second to scan the room, and nominates a new candidate:

> "Umm... Mike" ((Mike stands up and approaches the laptop)) "How are we going to- ((Mike interrupts the teacher to ask how big to make the table)) As big as you want. You put which size you want... So... tell everyone what you are doing as you do it. What are you clicking first? ((the teacher is gazing up towards the TV screen))" – [Transcript extract 28]

Mike is selected as demonstrator, and he accepts the task by standing up and walking towards the laptop. As he approaches, Mrs Davies starts initiating a new turn: "how are we going to...". Before she finishes the sentence, Mike is already inserting a table and interrupts to request some technical information about the task: "how big" should the table be?". Mike's question is not dealt with as an occasion to request or formulate substantive instructions, neither to reflect about this technical aspect of the task. Instead, Mrs Davies closes this inquiry by letting him choose: "as big as you want", she says. Mike's question is technically relevant as it anticipates what he would have to do effectively to insert a table, i.e., inserting a table necessarily involves specifying a number of rows and columns. However, the teacher's concern is with making Mike describe his actions as he goes about enacting them: "tell the class what you are doing as you do it" she instructs.

In facilitating instructions, Mrs Davies asks Mike to indicate what it is he is "clicking first". This hints at what the teacher may be expecting from his performance, i.e., what seems to be relevant for this moment of the instruction is, not only to demonstrate how to insert a table – for which Mike is showing competency – but to articulate these actions in the form of operable steps. Mike initiates an attempt to comply but quickly gives up and the teacher immediately takes over the instructing task. In terms of the ability to rely on pupils' knowledge and competency, Mrs Davies has overestimated the pupil's ability to produce operable steps on this occasion. This is a teacher's problem, and for the sake of

the natural progression of the lesson, it is for her to resolve, which she does by taking over the task of formulating verbal instructions:

> "Click insert- insert... He's got a table. Well done! ... He's moving over and he's just gonna make it as big- so he's made... ((Mike looks up to the TV screen)) There we go. As easy as that... Click on insert, click on table, and you can make a table" ((Mike walks back to the place where he was sitting before)) – [Transcript extract 29]

In this turn, Mrs Davies formulates an operable step ("clicking insert") – she is not commanding Mike what to do but describing what he is doing – and then the result ("he's got a table"), which is accompanied by a positive evaluation ("well done"). As with the teacher's body actions involved in previous demonstration sequences, Mike's body actions are also blackboxed. In translating Mike's actions into operable steps, the teacher is not concerned with what Mike does with his body. Watching the product of his actions on the screen is enough to instruct and ratify the activity. However, there is a mismatch between the teacher's ratifying turn and Mike's completion of the table. Mike does not return to his seat immediately after the teacher's evaluation. Instead, he continues editing the table and Mrs Davies, who has taken over the task of describing Mike's actions, attempts to follow by translating *in vivo* actions into an account. We notice a shift from the formulation of predictable operable steps (embedded in a commonly structured teacher's response) to a vague and incomplete narration of Mike's actions: "He's moving over and he's just gonna make it as big- so he's made... there we go" she says as he drags the lower edge of the table down to increase the size of the table. When Mike returns to sit among the group, the teacher wraps up by formulating two operable steps and their product: "click on insert, click on table, and you can make a table".

In this sequence, one can see how producing verbal instructions that articulate the process of inserting the table (as the task is being accomplished) is treated as central by the teacher. We see this in the effort she puts into coordinating both instruction and demonstration. Here, the teacher anticipates that inserting the table is the kind of action that can be *tricky* for this group of pupils, and she sees the need, not only to enable a demonstration, but secure a formulation of operable steps. So far, we have seen that pupils have the job of

reconstructing the teacher's instructions in order to complete their independent learning activities adequately. However, on this occasion, we also see the teacher doing the inversed work of reconstructing what the pupil is doing, for the sake of providing followable instructions. Thus, if demonstrations are aimed towards, and seen as, a way to address issues of ambiguity, incompleteness, and adequacy (Garfinkel 2002), for this particular occasion, they are not enough on their own. In this sense, there is a preference to make actions subject to verbal instruction when possible. However, producing an account of the pupil's interaction with the software *in vivo* has its challenges; not only can the pupils keep tweaking the table for longer than expected, but the account of actions presents features of indexical expressions. That is to say, since the intelligibility of the action is constantly unfolding, accounts are subject to indefinite elaboration (Garfinkel 1967); *sequencing* on the go is also a skilful accomplishment.

3. Enacting cross-curricularity

> "Mike has actually made three columns... ((the teacher opens her arms and orients her body towards the TV screen)) do we need three columns? ((children answer 'no' in unions)) We only need two ((a pupil repeats aloud 'two')) ((the teacher gazes at the pupils)) But that's alright Mike. I did say make it as big as- as big as you want" – [Transcript extract 30]

Once the instructions for inserting a table in Google Docs is completed, the teacher orients her body towards the TV screen, opens her arms, and points at the fact that Mike created a table with three columns. Then, she asks the class to consider whether they need three columns. In unison, the class responds "no". Mrs Davies turns to see the class and confirms that indeed they only need two columns. Thus, although Mike showed competency at inserting a table on a Google Docs, he did not relate the action to the specific task of creating 'a list of pros and cons of using animals for entertainment purposes'. The deployment of digital skills is, therefore, assessed in relation to the activity in which it is embedded.

Having Mike ask for specifics on this issue before inserting the table, Mrs Davies repairs ("it's all right Mike"), taking accountability for allowing him to make this *mistake* in the

first place ("I did say make it as big as you want"). This repair hints to a potential responsibility issue, which has less to do with Mike failing to consider the context of the activity, and more with Mrs Davies failing to help Mike when requesting this action. This demonstration of accountability is an interesting feature of classroom interaction in considering what happens when instructions are not adequately provided. That is to say the teacher is accountable for the appropriateness of their instructions. If following their instructions (e.g., making the table as big as they want) does not produce the expected outcome (a table with two columns), this is a teacher's problem.

The absence of concrete instructions illustrates the way in which the details of what constitutes instructing as an activity are not necessarily pregiven. In other words, because they are an interactional phenomenon, instructions are produced reflexively in and through the teacher's and the pupils' engagement with one another and with the software. In this sense, *mutual addressivity* (John and Crombal 2016) or *mutual entrainment* (Collins 2004) between the teacher and the pupils offer *perspicuous* occasions for inspecting the participants meaningful orientations to the production of instruction *in vivo*. Assumptions about what instructing adequately the task might look like are, thus, worked out *on the go*.

Moreover, *mistakes* like this are instructive in themselves. If Mike had not made this mistake, perhaps the teacher would have not seen a reason to clarify the need for only having two columns and some pupils would have committed this mistake during their independent learning activity. But he did it and therefore this matter is topicalised:

> "We need two columns because one column is going to be for what? ((the children shout 'pros' at staged intervals)) Pros... and the other column is gonna be for... ((pupils answer 'cons' simultaneously)) Cons" – [Transcript extract 31]

Mrs Davies reorients the lesson towards the rationality of the task as embedded in the activity ("we need two columns because..."). However, she does this by recruiting pupils' participation. She asks them to formulate the content that will fill each column. First, the class answers, not as forthcoming and at staged intervals, that they need one column for

"pros", and this is ratified by the teacher who confirms by repeating "pros". Then, with a bit more confidence, the pupils reply together that a second columns is for "cons", and the teacher once again ratifies their answer by repeating it.

It is worth noting that, although this part of the sequence is instructional there is no explicit formulation of operational steps. It is an instruction because it provides guidance for the pupils to accomplish the activity adequately. In this sense, the instruction lays down a main precept: pupils need a table with two columns, one for pros and one for cons. However, this is a different kind of instruction from step-by-step formulations (Lindwall *et al.* 2015). The lack of operational steps indicates two things. On the one hand, stating pupils will need only two columns is detailed enough for them to reconstruct what they will need to do with the software, especially after Mike's demonstration of how to insert a table. On the other hand, this sequence has a different pedagogical aim: to check pupils understanding of the activity. The verification of the pupils' understanding is to be found in the supply of answers that treat 'pros' and 'cons' as devices for organising the activity's materials. Understanding the purpose of the activity, in its wider sense, is made evidencable by this checking procedure.

Scaffolding layers of competence

> "Now, you might not know... We've only just started looking into animals being used for entertainment purposes so you might not know what the pros and cons are... we've just talked a bit about horse racing... but if you Google your ideas on the iPads and the laptops, it will come up with lots of different ideas" – [Transcript extract 32]

As the instructional sequence shifts from the specificities of what is involved in using Google Docs to the specificities of what is involved on creating a list of pros and cons, Mrs Davies brackets the sequence to address what could be seen as a pupil's problem and its solution. In doing so she introduces the possibility of relying on another elemental digital activity: searching for information online. To complete the list, pupils are not expected to know beforehand a complete list of *the* pros and cons of using animals for entertainment, although they need to know what 'pros' and 'cons' are, i.e., what these

terms stand for as typicalities, in Schütz's (1973) sense, and what qualifies as a pro or a con of using animals for entertainment purposes. Examples of this were discussed before the instructions on the ICT activity started at the beginning of the lesson. The teacher reminds pupils of this with a *tying procedure* ("we've just talked a bit about horse racing").

Searching for information online is stipulated in the DCF as an activity that requires digital competency in itself. Indeed, it can be found under the strand of *Producing*, the element of *Sourcing, searching, and planning digital content*. In the context of this particular activity, however, searching for information online is not the focus of detailed instructional practice as, for example, was accessing to Google Docs and inserting a table. Mrs Davies does not articulate operable steps, neither does she provide a demonstration. The absence of these forms of instruction hints at an assumed familiarity with the activity of searching for information online. Pupils are assumed to know how to search in Google for relevant content using their iPads and laptops.

The different instructional treatment of these two activities (*creating digital content* and *searching online*) on behalf of the teacher, offers pupils the opportunity to (as with editing text) scaffold different displays of competency. For example, pupils can display not only they have learned how to access a blank document in Google for Education, type a title, edit text, and insert a table, but they can now bring into use previously learnt skills on how to search for information to populate the table adequately, even if they do not know the pros and cons beforehand.

In addition, conducting a successful search and choosing among possible pros and cons demonstrates not only digital but academic competence. As I have already stated, the teacher is not only teaching how to use Google Docs, but how to use Google Docs for the purpose of constructing a list of the pros and cons of using animals for entertainment. That is to say, the explicit features of Google Docs (tables, text, etc.) and the explicit suggestion to search online for content are brought up in relation to the overall aim of producing an informed discussion regarding their main inquiry: Should zoos be banned? In other words, this is not a stand-alone lesson on Google Docs, but in enacting the cross-curricular demand of the DCF, ICT activities are instructed in conjunction with the other educational outcomes in mind.

Co-instructing as a procedure for checking pupils' engagement

> "When you have finished, your table- Amelia? ((the teaches gazes towards Amelia)) What are you going to do then? ((a different pupils answers "go and show it to you")) Ahh shhh... I wanted Amelia to answer because she wasn't listening... Maybe Ben can tell me? ((Ben does not respond)) What do you think Ben? What would you do when you finish?" – [Transcript extract 33]

The teacher starts this sequence by requesting a pupil to formulate final steps, i.e., what to do when they have finished their list of pros and cons. Unlike previous requests that were first oriented towards the whole class, this time, Mrs Davies address first a specific child, Amelia. A different pupil, however, in following the *participation framework* (Goffman 1981) of previous sequences, self-selects herself as the next speaker. In answering the question, she formulates a next instruction "go and show it to you". Her answer not only complies with what had been the participatory scheme so far (any child can self-select themselves), but it also fits the general asymmetrical dynamic described in previous sections, i.e., the pupils' awareness that their activities must be ratified by the teacher.

However, we learn next that the teacher does not only want someone to formulate a final instruction, but by addressing the question to a particular pupil who "wasn't listening", she is reminding pupils of the participatory expectations for this instructional activity. Pupils – or at least those who did not do the activity on the previous day – need to pay close attention to what the teacher is saying *at all times*. A way of checking whether pupils are listening is asking them to provide an adequate next turn. Balancing between *control* and *instruction* is reported to be the teacher's *foci* (Delamont 1983). Such regulatory exchanges are pervasive features of school lessons (Freebody and Freiberg, 2000). In examining them here, we can account for the ways in which the institutional and interactional order operate to sanction the *misbehaviour* of a child, making certain kinds of behaviours relevant to the local moral order of the classroom.

The significance of this event lies in being able to observe the way teaching practices are complex and multi-tasked. By this, I mean the teacher not only conducts a pedagogical

dialogue with the aim of achieving a concrete desirable learning outcome, but at the same time, other *teachings* are occurring. This can be seen as part of what is often called the hidden curriculum. How this gets done will vary between teacher and their teaching style. However, this example shows the teaching of digital competency does not happen in isolation, independently of other teaching practices. On the contrary, it is entangled with a variety of pedagogical (and non-pedagogical) activities. This may have not been made obvious as the data presented here (and in the rest of the chapters) omits some bits of the interaction that were not pedagogically focused on the instruction of the ICT activity, as stated Chapter 3. However, this occasion is used here to illustrate further the kind of scenarios in which the provision of activity instructions is embedded.

After stating the reasons for asking Amelia specifically, the teacher proposes a next candidate: "maybe Ben can tell me?" she says. Ben does not respond, and the teacher produces a variant of the request made at the beginning of the sequence: "what would you do when you finish?". Ben stays silent. The teacher resumes the request for next instruction by opening the opportunity for a new child to nominate themselves as the next speaker. More concretely, she requests for someone to "help Ben out", thus, not closing Ben's chance to provide a contribution. The same child that provided a candidate next instruction ("go and show it to you"), and who claimed they knew the answer, makes a third attempt at being selected, but she is once more ignored. Mrs Davies nominates Killian. Ignoring this pupil's attempts at nominating herself could be seen as another form of managing pupils' behaviour. For example, if a child tries to answer a question that was not addressed to them, they can be ignored as a form of hinting at the inappropriateness of their behaviour.

The teacher recruits Killian as next instructor and he proposes as following steps to "save it and share it".

> "Save it and share it with me ((the teacher looks up to the TV and point at the right top corner of the screen)) you can see the share button on the right-hand corner... ((the teacher looks back to the pupils)) What's my email? ((the children shout the email at staged intervals)) Well done! Davies-at-Cymru-dot-net ((the children repeated it again after her))" – [Transcript extract 34]

Mrs Davies indicates visually how this task can be done. She does so by pointing at the *place* on Google Docs where they can click to share the document. Whilst she points at it, she verbally instructs where to find it. We can reasonably assume this is also a task the pupils are familiar with, and this pointing action is more a reminder than a new instruction. Indeed, when Mrs Davies ask the pupils for her email, they provide an adequate answer. Children shout out loud in staged intervals Mrs Davies's email address. They have learned her email previously for the completion of past assignments.

Moreover, we learn through Killian's answer that the answer provided by the other pupil was not what the teacher was looking for in the first place; "save it and share it" *vs* "go and show it to you", which is what they do when they do activities in their books. The teacher does not want pupils to take their laptops and iPads to where she is (occupied with another group doing another activity), but to save it and share it digitally. Saving and sharing also constitutes one of the activities indicated in the DCF. The *Interacting and Collaborating* includes a section called *Storing and Sharing*.

After accomplishing the co-produced instruction of the last action to complete the task successfully, the teacher provides information of what they will do with the product of this ICT activity:

> "Share it with me when you finish, and we'll be able to have a look, and we will be able to discuss the pros and cons of using animals for entertainment" – [Transcript extract 35]

This last turn confirms the expected end-product of the independent learning activity: a digitally produced document where relevant enquiry-related information is collected, organised, stored, and shared, and which will be used to inform a discussion on the topic of the enquiry.

4. Conclusion

This chapter has examined the mundane details of the unfolding of an instructional sequence for an ICT independent learning activity, and its implications for the way in

which the priorities of the DCF are assembled and realised through the interactions of the members of the scene. In other words, the analysis details how the teacher and the pupils *work* together (although not without challenges) to make digital competency visible, accessible, and reportable *for all practical purposes*. The chapter shows how instructions are sequenced, crafted collaboratively, *in vivo,* embodied, and oriented to the phenomenal field made available by the technology. It is a finding of this chapter that instructions are produced to locally objectivate predicates of digital competency (e.g., to create a Google document where information such as 'pros and cons of using animals for entertainment purposes' is competently gathered and presented). That is to say, the articulation of the activity specificities yields the details by which digital competency is reconstructed as a sequence of practical actions. Consequently, to demonstrate digital competence is to demonstrate an understanding of the instructions and how to follow them. In facilitating this task, demonstrations play a substantial role.

Moreover, in this chapter I have discussed how the instructions showed indexical properties, posing problems of clarity, consistency, completeness, followability, factual adequacy (Garfinkel 2002), by demonstrating the followability of the instructions Mrs Davies produces an *in vivo* and embodied description of how to follow her instructions. Although demonstrations were seen as a way to address issues of ambiguity, incompleteness, and adequacy (Garfinkel 2002), for this particular occasion, they were not enough on their own, and there was a preference to make embodied actions subject to verbal instruction when possible. This chapter also demonstrated how ICT independent learning activity instructions are populated by the formulation of operable steps regarding 'what to do' with a software. These are produced in such a way that can resembled direction-giving or recipe like instructional forms. For example, (1) go into your Hwb page; (2) click on Google for Education; (3) click on the waffle; (4) click on Docs; (5) type a title; (4) insert a table, etc. But not all tasks were broken into operable steps (e.g., how to change the format of a text or how to search for information online).

Furthermore, this chapter has shown how the teacher explains the technical functionalities of the software and simultaneously she tells pupils what they should do with it for the purpose of the activity. The use of the software and its properties are not

taught in isolation. In this sense, the material and virtual constraints of technological affordances are emergent, produced, and made perspicuous at different times throughout the demonstrations. As such, software features are seen as interactional accomplishments, i.e., interpreted, emergent, and occasioned. They appear in synchronicity to participants' deployments of the software properties to accomplish the next instructional turn, whether this is 'going there' or 'clicking that'. One example of this was shown when the teacher bracketed her directions and demonstration on how to get to Google Docs to introduce a future instruction (getting someone to show what to do in Google Docs) during the exact time between clicking over the button, and the opening of a new window. This example evidenced ways in which the technological conditions (i.e., the broadband speed or the laptop's operative system) can affect the temporal rhythm of the teacher's verbal instruction and embodied demonstration, demonstrating the teacher's skill in adapting to this material temporality.

The instance when the teacher pointed at the text editing options can be seen as another example, but of a different kind. On this occasion, the articulation of instructions went hand-in-hand with the visual and functional arrangements of the software layout. The organisation of the feature marked the sequential organisation of the instructions, whilst the sequential organisation of the instruction provided an ordered way of seeing and executing the task. Thus, although an account of the use of the technology in the classroom cannot presuppose digital technology's inherent qualities, we can study the way teachers perform instructions that assume shared methods for locating and objectivating properties of the software in a practical way. Technological features emerge as objects as the teacher explains what to do with them for the purpose of accomplishing the task at hand.

Additionally, in this chapter, I have also shown how the technology (from the laptop to the software suite) became a tool to accomplish an activity, and the activity an experiential opportunity to develop the competent use of technology, following a kind of feedback loop. To do so, the teacher implicates and mobilises a variety of already-acquired skills and knowledges (from procedural knowledge, such as 'how to edit text', to substantive knowledge, such as what a 'pro' and a 'con' is). The teacher regularly and

unproblematically produced instructions that inevitably rely on assumptions regarding pupils' shared knowledge. Of course, there is room to get assumptions wrong (e.g., when the teacher asks Mike to instruct and demonstrate at the same time). Nevertheless, this kind of tacit knowledge is an essential part of instructions for the acquisition of digital skills. For example, the embodied knowledge required to manipulate the technology effectively is taken for granted and excluded from instructional detail. However, it is implicitly constituting a base layer competency from which the teacher sets up activities aimed at developing digital skills. In short, some blackboxes do not need to be open in order to develop competency. On the contrary, the task of developing digital competency in the classroom requires relying on various kinds of blackboxes.

Finally, this chapter has demonstrated how ICT activity instructions are intertwined with the instruction of other activities and educational outcomes. In continuing with the observations made in Chapter 4, the analysis showed a teacher using *tying procedures* (Garfinkel 2002), i.e., orienting to the class's specific history and educational trajectory. This is a persistent feature of formal educational contexts in which lessons (or lectures) are one within a collection of learning activities (Payne 1976; Garfinkel 2002; Eglin 2009). Acknowledging this is a method that allows teachers to make pupils accountable for expected knowledge about an activity.

Using similar analytical sensibilities, in the next chapter (the last findings chapter), I turn my gaze towards examining how the teacher's insufficient instruction can undermine and threaten classroom order. To do this, I give close attention to the way that the emergence of unwanted *turn-produced categories* (Watson 2015) is managed by participants in the scene. Specifically, I focus upon a pupil who instructs (as an answer to a genuine question, rather than a question-with-known-answer, as we have seen so far) and a teacher that is instructed. I use this encounter to enable a discussion about a common concern reported by some teachers regarding the confidence they have in their own digital knowledge and skills, and the implications of this for the success of a digital curriculum

Chapter 6: Classroom order and teacher's digital competence

> 'Yet technology will not go away, and educators have to come to terms with it as an educational tool' (Cuban 2001, p. 194).

Reflecting on Cuban's prediction made more than two decades ago, technology has not only not gone away, but it is further embedded in the expectation of what *good* 21st century education should look like. The new Curriculum for Wales 2022 is an example of that. However, this expectation is still a relatively new experience for teachers in Welsh primary schools, and *coming to terms* with it can pose challenges for everyday classroom life. My intention in this chapter is to bring to the surface this challenge through the detailed analysis of a classroom encounter in which an apparent lack of teacher's technical knowledge (regarding what pupils need to access their online assignments) poses a problem for classroom work. I see this case as constitutive of an issue that teachers have reported to be pervasive when enacting the DCF and integrating digital technology into their everyday educational practices and which can be related to teachers' own confidence in their digital competency.

It is worth noting that, whilst teacher's competency (or questions about it) is one strand of inquiry in this chapter, it is discussed alongside a variety of other classroom-bound phenomena. In continuing with the analytical inclinations of the previous chapters, the analysis focuses on examining the constitution of a classroom problem and the resources and procedures members of the scene implement in solving this problem. For the purpose of analysing this encounter, I examine the verbal, embodied, and material resources participants mobilise to communicate the problem, negotiate its legitimacy and relevance, and finally, produce a solution. Conducting such an analysis necessarily implicates a sensitivity towards one of the main topics of educational ethnography, the establishment, negotiation, challenge, and accomplishment of a classroom order (Pollard 1982; Woods 1990; Hester and Francis 2000).

Along with an ethnographic description of the event, the analysis borrows from ethnomethodology, and particularly *membership categorisation analysis* (Hester and Eglin 1997; Fitzgerald and Housley 2015), a sensitivity towards the sequential production of actions and the layered membership category devices emerging and embroiling in the scene. While in Chapters 4 and 5, I examined the way certain contextually relevant verbal and embodied actions were rendered as the culturally recognisable actions of *setting-appropriate* categories (Jayyusi 1984) such as 'teacher' and 'pupil', in this chapter, the analysis focuses on the shifting and layering dynamic of the *categorial landscape* (Jimenez and Smith 2021) and the tensions that emerge from it. Even so, the chapter is a continuation of Chapter 5 in that, I examine how incomplete/inaccurate instructions are objectivated and made a work object, as well as the work that gets done to repair such incompleteness. The analytical questions guiding this chapter are: (i) *How the teacher and the pupil manage troubles arising from the teacher's digital competence?* And (ii) *What does this scene tell us about the challenges teachers may face when integrating new practices and technologies?*

The chapter is organised in accordance with the chronological unfolding of the event, from the moment in which the problem is reported to the moment in which a repair is provided. Three main sections structure the encounter around the analytical themes of (1) making the teacher's insufficient instruction (and consequently her digital competence) an accountable object, (2) participants' negotiation of the definition of the situation, and (3) the accomplishment of a repair (both of the instructions and of the classroom order dynamics). Figuring out *what is really going on* – in Goffman's (1967) terms – demanded a tuned multimodal approach to the sequential unfolding of the interaction. That is, because although the teacher ends up requesting genuine – and not simulated (as in Chapter 5) – instruction on how to facilitate a Google classroom code to access the online assignments, on closer inspection we see both the teacher and the pupils resisting the inversion of roles. That is, they avoid enacting a situation in which we have pupils who instruct and a teacher who is instructed. The third section also includes a reflection on the issue of teachers' digital competence as a wider issue and concludes by identifying a need for further research.

1. Accounting for insufficient instruction

The interactions described and analysed in the following sections correspond with that between a teacher, Miss Floyd, and her Year 5 pupils in a Monday morning session. Miss Floyd is a young teacher, who had recently joined the school. Before, she had taught at a Welsh-medium primary school for a couple of years. The approach of her previous school was very different; she described it as more traditional. They did not follow an IBL (Inquiry Base Learning) approach, neither did they divide the sessions into a carousel of activities, and in terms of integrating the DCF into their practice, Miss Floyd described it as being far behind[57].

When I was negotiating access to the classroom, of all the teachers, she was the only one that showed some reluctance. Being her first term in the school, her hesitation was completely understandable. Mrs Jones, the school Digital Lead and the person who acted as a gatekeeper for my field access, encouraged Miss Floyd by complimenting her. Mrs Jones said she was a great teacher and she had nothing to worry about. On a later occasion, Mrs Jones said that the school had been looking for someone like Miss Floyd for a while, someone strong in the Welsh language to help raise the level of Welsh in the school, which the Estyn report (2017) assessed as low. The 'newness' of Miss Floyd and her strength in the Welsh language are both relevant ethnographic details to contextualise the events that I am about to describe.

In a similar way that Miss Hughes and Mrs Davies organised their classes (Chapter 4 and 5), Miss Floyd divided the class into three activities: (1) a teacher-focused group doing maths exercises; (2) a group with a LSA (Learning Support Assistant) doing research on Fairtrade (which was the topic of their autumn term enquiry); and (3) a group doing an ICT independent learning activity. The task for the ICT independent learning activity

[57] I conducted the fieldwork for this project early in the academic year 2019-2020, although the DCF was made available to schools in 2016, there was no obligation to implement it before the full roll out of the curriculum in 2022. Therefore, it is reasonable that some schools had not yet integrated the DCF into their everyday teaching practices. The case of the school where I conducted my observations is different because it had some very enthusiastic practitioners pushing for digital leadership in the region.

consisted of working through a birthday party spreadsheet, adding numbers in cells that would represent quantities of food items (e.g., ice-cream, sausage rolls, cake, and so on) with given prices, without exceeding the budget of £100. As in previous cases, the teacher provided instructions to the whole class – which on that day, was a class of 26 pupils due to some absences. The arrival of the autumn often brings the spread of common cold across the school.

As was the case with Miss Hughes in Chapter 4, Miss Floyd also monitored who sat next to whom, asking pupils to find *their* place. Once everyone was seated and in silence, the teacher introduced the topic of that session's activities ("money") and explained that those activities were designed in preparation for their "Christmas market". She said this whispering, since the children were not allowed to talk about it due to the excitement it produced in them. The teacher warned them about the potential unfamiliarity with aspects of this ICT task as they had not used a spreadsheet before in this class. Miss Floyd introduced the pupils to *ways of seeing* a spreadsheet, locating rows, columns, and hence cells ("as in a chess game", she claimed), and they were also introduced to the concept of *formulas* as relevant features of spreadsheets. However, unlike in Chapter 5, the process of virtually accessing the software to conduct their assignments was not made an object of instruction.

The encounter occurs halfway through the session. The teacher is seated on the carpet by the whiteboard surrounded by a group of pupils. According to the carousel planning, this is the teacher-focused group, and they are having a maths lesson. The teacher uses her computer to project onto the whiteboard the details of some maths exercises and a grid for pupils to write on top of and align the numbers adequately when completing the exercises. Miss Floyd is using PowerPoint to present the details of the exercises. The pupils are generally listening to what the teacher says and acting accordingly. Occasionally, pupils nominated and instructed by the teacher stand up and complete (or attempt to complete) the maths exercises on the whiteboard.

In contrast to other observations of ICT independent learning activities, where although pupils were expected to complete the task on their own and the teacher would occasionally walk around the room checking on their progress, here, the teacher is seated

on the floor, at the very opposite end of the room, surrounded by the pupils of the teacher-focused group. She does not get up on any occasion to check on the work of the pupils doing the ICT activity. In fact, in the instances in which the teacher speaks to the ICT group (as a whole), she does so from the distance, raising her voice to reach the other side of the room, to condemn the group's behaviour (e.g., "ICT group should be in absolute silence"). There are also a few instances in which pupils approach Miss Floyd to request assistance. These instances are brief, with the teacher redirecting the help towards other pupils ("uh, who can help you? Has anyone else tried?"). By doing this, Miss Floyd establishes a participatory framework that sets up expectations regarding how and under which circumstances it is appropriate to interrupt the teacher-focused group. In other words, the chatter should not disturb the teacher-focused group activities on the other side of the room, and if pupils seek help, they must first try to get help from a classmate.

The following sections provide the lived details of how a problem of access is made reportable, how parties to the scene negotiate the definition of the situation, and ultimately how it is collaboratively resolved with great sensitivity towards the local categorical order of the scene.

Making reportable the absence of an instruction

The pupils of the ICT group are not working on their assigned activity, a 'Birthday Party Spreadsheet'. They are distracted and frustrated, standing up and walking to each other's computers, chatting among themselves. The reason is they cannot access their assignment. A pupil from the ICT group starts approaching the teacher's group when Miss Floyd looks up towards him from the distance. He reports experiencing troubles with the assignment. The teacher deflects the provision of assistance towards the ICT group, "who can help you?" she asks whilst pointing at the group of pupils at the back of the classroom, and quickly returns the attention to her maths group. The ICT group continues working together to figure out the problem. As their chat volume increases the teacher calls to them "ICT group!" from the opposite side of the room. They stop chatting and the teacher indicates "that's the level of noise" she wants, i.e., none. After a few more

verbal and visual exchanges among the ICT pupils, Will is assigned the task of reporting to the teacher the problem they are collectively experiencing with the task:

> Will walks across the classroom room, navigating through the group of children seated on the floor until reaching the teacher. The teacher takes a few seconds to acknowledge his presence, then she greets him, "Hi buddy". Will, with the hands in his pockets, does not greet back. He seems to think for a second how to express what he is about to say, "uhm...", and then goes straight to the point: "We need the classroom code to access the class". The teacher responds by leaning forward to reach her laptop and exclaims "Uh... I got it" – [Fieldnote extract 2]

Reporting the problem translates it into a request. It is a request in the sense that it is soliciting an action from the teacher – identifying her as the relevant actor to address a missing piece of information for the accomplishment of the independent learning activity. Both the problem (in accessing the class) and the solution (the classroom code) are built into such request, as it is the distribution of rights and obligations of the parties of the scene (pupils ask for help and teachers provide it). In this sense, the request locates responsibility to the teacher to solve the problem – responsibility that, as we will see, the teacher initially resists.

Moreover, the concise format of Will's turn shows a sensitivity towards the context in which it is being produced, i.e., Will is interrupting the teacher's main activity. He is orienting to the requirements of his interruption: firstly, by waiting to be greeted by the teacher, whose category's predicates involve domain over the allocation of turns, and secondly, by taking the teacher's greeting not as a *usual* greeting – for which a greeting back would be the expected thing to do – but as a permission to communicate a classroom-related issue. This kind of turn fits the description of what Sacks (1975, p. 67) called *tickets*. That is, in situations in which a person is seeking to engage another in conversation, but it is situationally seen as not a proper conversationalist for the other person, one way they might do so is to begin not with greetings but by using an utterance that locates how/why they have come to talk to them.

Furthermore, Will is reporting this problem of access as a collective problem. He uses "we" as gloss for the ICT group. Usually, in independent learning activities, the teacher tends to divert sources of help and assistance towards other pupils but making it a problem for all the ICT group narrows down the sources of help. The classroom code is essential for students to access a class online and access their digital assignments. Usually, it only needs to be done once. The fact that pupils are having to ask for it may indicate that – for whatever reason – the process of granting access to the pupils had not been done yet, at least not effectively so. Subsequently, if the classroom code had not been provided, this constitutes a problem for all pupils rather than just one.

Even though Will's request seems to be taken as unexpected, and we can see this in the way that the teacher reacts to the information facilitated – registering it as "news" with the token "uh" – her response "I got it" indicates a compliance with the request. The teacher orients to Will's request as something she, as the teacher, can (and should) act upon.

> Will initiates his return to the ICT group, whilst the teacher calls out a different pupil from the ICT group and asks: "Sean, where is your paper?". Sean responds by indicating he is looking of it. "Good job", says the teacher – [Fieldnote extract 3]

From Will's point of view, his work is done, the message has been delivered and the teacher is dealing with the issue now, so he initiates a return to the ICT group. However, Miss Floyd immediately asks Sean (in the ICT group) to locate *his* paper. This action implies that the paper is instrumental in finding the classroom code. In other words, the paper presumably would have the code. The formulation of the sentence also evokes a sense of liability and consequently a way of diverting the assistance requested, which as we have seen, is a preferable course of action for the teacher. Moreover, Sean is the classroom's 'digital leader'.

The figure of the 'digital leader' – which must not be confused with Mrs Jones role as the school's Digital Lead – is a special role a pupil may occupy in their class if the school has signed up to the Purple Mash Digital Leaders Scheme provided by Just2Simple. This is an educational software company focused, among other things, on developing tools to

teach computing at a primary school level. The software they use for this purpose is called Purple Mash. The Digital Leaders Scheme is designed for 'children with a passion for technology' (Just2Simple n/d), to offer them an opportunity to take an active role in promoting the use of digital technologies throughout the school. It involves taking over certain responsibilities, learning specific digital skills, and developing leadership capabilities[58].

Although the teacher does not invoke Sean's membership of the category 'digital leader' explicitly, she does so implicitly by naming the pupil who officially occupies the role and by invoking a predicate of such category, namely, to support the teacher and other pupils with the use of digital technology. Thus, although Miss Floyd has abandoned the task of finding the code, she is still doing teacher's *work*. She is facilitating the resolution of the problem by redirecting it to Sean, the digital leader, who, among other responsibilities, has a responsibility over a "the paper", which we can assume contains the 'classroom code' (or at least that is what the teacher seems to think). Sean, moreover, still a pupil, is treated as such. The teacher ratifies Sean's actions (with a "good job") when he indicated he is looking for the paper.

These details show how members' actions render visible the organisation of the teacher's authority as a practical accomplishment (Macbeth 1991), even though a problem over her digital competence is starting to emerge. What happens next presents itself as an opportunity to observe the methods that participants in the scene assemble and mobilise to keep orienting to these locally accomplished features of the classroom order, even when the problem becomes more evident.

[58] In all the classes, I observed there was a digital leader chosen by the teacher. The programme seems to be popular among schools actively participating in digital activities across the regional consortium. Participating in these sorts of programmes were worn as badges of commitment to the standards of digital learning in quite a literal sense. The different schools I visited, for the purpose of attending workshops, displayed diplomas showing their participation in these kinds of programmes and any awards they may have won through their participation.

A pupil objectivating a teacher's inaccuracy

> After a few seconds, Will approaches the teacher again with the paper that Sean gave him at hand. He displays it for the teacher to see and she says "that's what you need, isn't it? And now you can go log into the classroom", whilst she points towards the ICT area. To this Will answers: "yeah, but this wouldn't let you into the classroom", whilst holding up the paper for Miss Floyd to see – [Fieldnote extract 4]

Will's response seems to confirm that the paper indeed contains some kind of code or password that could be mistaken for the classroom code but that in fact is not. We see this in Will's use of the agreeing marker, "yeah", offering an explanation "but this wouldn't let you into the classroom", to then restate again that what they actually need is "a classroom code". Will's articulation of the problem and its solution done in his previous turn was practically noneffective, as the teacher has failed to recognise the need for a classroom code and where to find it. This revelation makes apparent that the teacher lacks knowledge regarding a matter that we could reasonably assume – as the pupils do – would be, in this situation, a teacher's knowledge. That is, the teacher who asks their pupils to complete an online assignment on Google Classroom, manages the online class that contains such assignments, and has access to information such as the classroom code, should know when the pupils would need a classroom code and where to find it. In sum, the teacher is not only showing that she lacks the relevant knowledge for accessing online assignments, but because of this, she is also failing to perform a relevant category bounded activity: to facilitate the solution of a classroom problem and to be assertive with her instructions. In this sense, there is a *breach* – in an ethnomethodological sense (Garfinkel 1967) – in the typicality of the pattern or rubric of classroom order.

As discussed throughout this thesis, classroom scenes are staffed by incumbents of the setting-appropriate categories such as 'teacher' and 'pupil', which are tacit and *omnirelevant* (Sacks 1976, 1992). Omnirelevance here means that, throughout the unfolding of the interaction, these categories are always potentially applicable and that, when invoked, have priority in terms of organising action. Furthermore, the teacher-pupil(s) pair is see-able as going together in regard to their rights and obligations. When

categories are seen as naturally going together (e.g., doctor-patient or police-suspect, to mention other examples) we can see them as co-constituting each other as well as the setting in which they are found (a medical consultation, a police interrogation, a lesson, etc.). Sacks (1972) called these category pairs *standardised relational pairs* and described them as *loci* for moral imputations because of how they work to organise talk in interaction and set expectations for next actions. This aligns with Goffman's observation that 'all interactions are important rituals that work to maintain moral order as well as social order' (Goffman 1967, p. 52).

Other categories can also be interactionally occasioned and even become omni-relevant (e.g., 'ICT group' and 'digital leader') or turn-produced (e.g., 'instructor' and 'instructed' as we saw in Chapter 5). All of these varied categories are *bound up* with expectations relating to bodily and verbal actions, displays of knowledge, capacity to instruct, expectations about who follows instructions, and so on. They are, as has been explained in Chapter 5, *inference rich* (Sacks 1992). In his lectures, Sacks (1992) introduced the notion of category boundedness or *category bound activity*, which are those activities that commonsense permits us to associate with people who are see-able as the incumbents of a particular category. Thus, in a classroom setting, it is the teacher who is expected to facilitate learning and pupils who, under the instruction and support of the teacher, are expected to be learning something. Category bound activities, however, are just one class of category *predicates* (Eglin and Hester 1992), other predicates include rights, entitlements, obligations, knowledge, attributes, and competencies (Jayyusi 1984; Payne 1976; Payne and Hustler 1980; Watson 1978).

However, Lynch (2020, p. 145) warns us that *typical actions* are to be contrasted with the flexibility of its understanding *in vivo*, as situated and locally produced accomplishment, subject to being ongoingly worked out. That is, the incumbency of membership categories is tied to the local-sequential logic of the natural unfolding of the interaction as much as the sequential elements of the interaction are shaped by the members' orientation to relevant categories (Watson 1997, 2015). That is to say, categories and their predicates are not fixed even within an interaction. Categorial relevancies emerge or become *operative* 'at some point as the event unfolds and may evolve over the course of the

interaction' (Fitzgerald 2020, p. 94). In other words, the *categorial landscape* (Jimenez and Smith 2021) of any given activity is dynamic and shifting both in terms of its categorial relevancies and just how those categories organise the assembled production of the activity. In considering how typical actions are locally and ongoingly worked out, I examine how the problem between membership categories and their bounded predicates emerges through this encounter, whilst participants maintain a sensitivity to the omnirelevance of the category relationship pupil-teacher and its setting-specific asymmetry.

Will's utterance design is again significant in this regard. Although practically he is doing instructional repair by pointing at the persistence of the problem and the need for a solution, he starts by agreeing with the teacher's statement. This demonstrates a preference to avoid challenging the teacher in a direct way. He then goes on to state that whatever is on the paper would not let them into the classroom. In accomplishing this, the conjunction "but" is the shifting point. Moreover, I want to suggest that Will points at the teacher's mistake by formulating a self-evident truth with the following logic: this would not let you into the classroom because *this* is not the classroom code – which the teacher seems to have no option but to accept. Will's embodied actions are also consequential; the way he holds and shows the paper and points at it as evidence of the teacher's mistake. Using the paper (first invoked by the teacher as the solution) as evidence of the persistence of the problem, shifts the challenging source from the pupil to the paper itself. In other words, if the paper should have had the classroom code and it does not, then the paper is faulty. Will puts a significant amount of interactional work into not being seen as a pupil who challenges the teacher *per se*, but one that has solid grounds to do so, and he accomplishes this by objectivating the absence of the classroom code on the paper. Consistent with the way the term 'objectivate' has been used throughout the thesis, to say that the absence of the classroom code is objectivated, is to say that it acquires a *materiality* that allows it to 'sit there in the spectacle, permitting parties to use them as focal points for their collaborative attention' (Liberman 2018, p. n/a).

As it is 'the task of co-participants themselves to display categorial incumbency where relevant' (Watson 1997, p. 52), it is also the task of co-participants to avoid displaying

categorial incumbency or categories they do not want to be identified with. In this case, one could argue that Will is avoiding being seen as a challenging pupil. Challenging the teacher is inevitably tough for a pupil, as it compromises the taken-for-granted well-defined asymmetrical relationship between teachers and pupils. As I have shown in the previous chapters, teachers tend to dominate the classroom situation by lecturing, asking questions with answers they already know, giving instructions and directions, ratifying pupils contributions, and so on. Whilst pupils tend to do what they are told by the teacher, even when they engage in other activities, the teacher can intersect to demand their attention and 'correct' their behaviours.

2. Competing definitions of the situation

> "You need a classroom code, as well?" Miss Floyd asks Will. When he answers affirmatively, "yes, the classroom code as well", the teacher leans towards the laptop. What is projected on the screen changes from the maths exercise to the lyrics of a song they were practising earlier in the morning. Meanwhile, Miss Floyd questions Will again, "do you?", and once more he answers "yes". Then she asks for "one second" and Will runs back to the ICT group – [Fieldnote extract 5]

When Will states that the paper does not contain the classroom code, the teacher shows hesitancy in accepting Will's formulation of the problem. She does so despite recognising that the classroom code is not in the paper. This is seeable through the use of the expression "as well?", which implies she is realising that the information in the paper might be other than the classroom code. Built into this questioning is the possibility of another solution to the problem, which is the absence of it. In other words, she is proposing that perhaps they do not need the classroom code at all. We see this in the way she insists in challenging Will's (and by extension the ICT group's) claim regarding what they are reporting they *need*.

Will responds to the teacher's question by recycling the elements of the utterance, adding a confirmation marker, "yeah, the classroom code as well". The teacher sceptically asks again, "do you?", and Will – now for the fourth time – confirms, "yeah". Although the

teacher, whilst raising a question about the pupil's claim, initiates the search for the classroom code (and we see this in her approaching the laptop), she is still putting some work into sequentially organising a different output for this exchange. Miss Floyd is enabling a last opportunity for the pupil to provide a different answer. In addition, Will's response might remind us of the way teachers usually respond to pupils' contributions by repeating what they have said. However, Will's turn is toned more like a suspect being questioned, than a condescending comment. Thus, the teacher's control over the situation is something both participants are orienting to. She is exercising and displaying her right to question pupils' claims, and he is sequentially complying with this questioning. Despite this, Will's position remains unchanged. Subsequently, the teacher requests "one second" and initiates the task of searching for the classroom code in the computer.

One may question whether there are *reasonable grounds* for the teacher's scepticism about accepting whether they truly and accurately need a classroom code. To accept this would mean she did not know (or had forgotten) what the pupils *need* to access their assignments, and therefore had not provided full and adequate instructions. First when explaining the activity, and second when directing them to the paper as the place where to find the classroom code. Getting this right is part of her role as a teacher, not Sean's as digital leader nor another pupil. Indeed, it is a technical feature of Google Classroom that only users with a teacher account can manage this kind of information. If pupils cannot access their assignment because they have not been provided with the classroom code that is a teacher's problem to solve. Consequently, we can see how this would constitute a less favourable definition of the situation for Miss Floyd. It would put into question the teacher authority over knowledge, and it provides students with resources to legitimately challenge the teacher's definition of the situation.

Notes on the delicacy of classroom order

The successful incumbency of the category 'teacher' involves displaying a good amount control over a variety of aspects of the interaction (including control over knowledge and instruction). Of course, what *a good amount* is will vary according to, the teacher, the pupils, the schools, and the particular details of any actual occasion (Garfinkel 1996). I

have shown in previous chapters how the teacher organises a *pedagogical dialogue* (Chapter 4) or an *instructional sequence* (Chapter 5), so that the authority over knowledge is held by them. For this, they use a variety of methods working at different levels (e.g., the design of an educational outcome, of a classroom activity, asking questions with known answers, evaluating pupils' contributions, disciplining *misbehaviours*). We also saw how pupils tend to comply with such a situation. The ways in which teachers' control over knowledge is constantly reaffirmed in everyday classroom life has also been widely reported in the literature (Geer 1971; Hammersley 1976; Delamont 1983; Woods 1983; Macbeth 1991; Freebody and Freiberg 2000; among others). However, as Delamont (1983, p. 53) asserts: '[i]f control over knowledge is the teacher's strongest resource, it is also her Achille's heel'; 'without control, the teacher cannot instruct, and instruction is her *raison d'être*' (Delamont 1983, p. 71). Thus, being able to stay in control is consequential to the teacher's position within an educational situation. In other words, losing control over knowledge and the capacity to instruct correctly threatens the teacher's control over the situation, which is a signature feature of the successful incumbency of the category 'teacher'. My argument here is that, when the teacher cannot successfully action their category, an imminent threat to the pattern of classroom order emerges that requires immediate local repairs and adjudgments.

Following Lynch's warning mentioned above, the *shop floor* (Garfinkel 2002) character of membership categories demands an analysis that locates, describes, and shows when categories are displayed locally in just how and just when categorisations are operationally relevant for the activity at hand. Therefore, one may ask, how is the threat to the classroom order that I am here describing a members' phenomenon? In other words, how can we establish that a particular category device is made relevant or becomes under threat? To determine this, one may follow Sacks' advice:

> '*a* way that you go about selecting an identificatory category – given, say, that some action is going on, done by some person – is to determine if there is a category-bound activity of that sort, and if that person is a member of that category' (Sacks 1992, p. 588).

In Sacks' (1992) lectures, the analysis of omni-relevant devices in a therapy session was used to demonstrate the 'reflexive co-determination' of actions and identities (Schegloff 2007). From this, most research has tended to focus on omni-relevant devices invoked as appropriate to the sequential actions (Fitzgerald and Housley 2002; Schegloff 2007; Butler 2008), and in a smaller number, other research has examined instances where the lack of an action by an omni-relevant category is treated as a breach. One example is Butler's (2008) study of a children's game, where she shows how the omnirelevance of a device is used to organise a game based on *playing schools*. When the child playing the 'teacher' fails to allocate a next activity for the 'students', a child playing a 'student' called her out for not performing appropriately the role of the teacher; she asked, "aren't I supposed to do my work now?". Thus, the child displayed her attention to the categories and actions that were relevant and consequential for the scene by pointing at its absence. Another example is Moutinho's (2019) study of the local organisation of second language lessons, where he observed how the *standardised relational pair teacher-student* furnished most of the interaction format but that other relevant pairs also emerged. He shows how these other pairs are intentionally layered over through a variety of interactional methods but also, they sometimes emerged as a result of a contingency. It has been argued that these contingencies can produce a *hitch* (Fitzgerald *et al.* 2009) in the unfolding of the interaction. People momentarily 'halt doing what they are doing' (Fitzgerald *et al.* 2009, p.62) and 'an operation of an omnirelevant category has to be restored so that the previous activity can be resumed' (Moutinho 2019, p. 582).

The contingencies that create the hitch, in the case at hand, come about by the teacher's difficulties in providing the classroom code in just a few turns. In this sense, the chapter illustrates an instance in which members orient to a potential incongruency regarding the teacher's bounded predicate and how this is collaboratively repaired. This reveals the *delicacy* of classroom order. As it is shown in the following section, members orient their actions to avoid a potential shift or inversion between the *standardised category pair teacher-pupil(s)* and their respective predicates, who is expected to instruct and who is expected to be instructed, in a genuine way (again, not as in Chapter 5, where getting pupils to instruct was part of the pedagogical strategy). Ultimately, members orient to restoring the asymmetrical relationship of the *standardised category pair teacher-pupil(s)*.

3. Resisting a categorial shift

> It takes the teacher less than a second to arrive to Google Classroom, as she already had the window open on her laptop. The page screening is the 'Classroom Work' page of the classroom, which lists the assignments. She confirms to the pupils she has arrived by stating "this [the page screened on the whiteboard] is the classroom", even though it is the 'Classroom Work' page and not the 'Course Board', which would be the main page of the 'classroom'. "What do I need, Will?" she asks – [Fieldnote extract 6]

By going straight to Google Classroom, we can see Miss Floyd has some, albeit insufficient, knowledge about the object 'classroom code', i.e., by going into Google Classroom, she is demonstrating she is aware it is an object that exists in relation to Google Classroom. She does not ask "what is a classroom code?" or "where do I look for it?". Her actions demonstrate she has or has deduced, from the context in which the request was formulated that the "classroom" they have been referring to in previous turns is an online one, existing in the virtual environment of Google Classroom. Even though Miss Floyd's laptop screen is being projected on the whiteboard, and therefore, it is publicly available to those in the classroom, she announces to the class she has arrived at Google Classroom. This accomplishes at least two things. It recruits the attention of the pupils invested in the finding of the code, and it sets up the perceptual or *phenomenal field* (Gurwitsch 1964; Garfinkel 2002) that will frame the following actions.

> A couple of pupils from the teacher-focused group attempt to help by propositioning some sort of guidance for the teacher. "You just need ah..." one pupil said, and another completes the sentences, "the classroom code" – [Fieldnote extract 7]

Unlike most of the questions teachers produce in the classroom, this is not a question-with-a-known-answer. The question is, in a way, genuine. Although the pupils provide an adequate answer for the question "what do I need?", the teacher does not deal with these turns as contributions. This might be because the question was directed to Will, and she is sanctioning unsolicited contributions by ignoring them. Thus, the teacher might be reinforcing her rights to select the next speaker. However, we can also see these pupils'

answer as insufficient if we assume that the question the teacher formulates is in fact incomplete. This is to say, we can reasonably assume the question is ought to be heard as "what do I need [to do next]?"; a request for a next step action, rather than what she *needs* (which they have already established is to find the classroom code). Thus, what the teacher is requesting is indeed an instruction.

> The teacher turns her gaze to Will and asks again, "what do I need?". A few other pupils also look at Will whilst he replies, "go to settings?". As he utters his instruction he simultaneously points at the whiteboard, the place where 'Settings' is located on the page, represented in the form of a cogwheel. But the settings option is not opened, instead 'Course Board' page appears in the screen – [Fieldnote extract 8]

Will registers the Miss Floyd question as a request for instructions. We see this as he formulates a directive, "go to settings?". However, he is thinking on his feet. His turn shows hesitation and doubt. We see this in the way he formulates the directive as a question, almost like a suggestion. Moreover, although he produces a valid directive – indeed, in 'settings' the teacher would have found two options to 'manage the invitation codes', either via the option of 'show the code to the class', or 'share an invitation link' – he is still a pupil in front of a teacher and his contribution yields ratification.

Despite the adequacy of Will's proposed next step, and the fact that the teacher instigated the production of such instruction, Miss Floyd does not follow his instruction. In this sense, it can be argued that 'instruction' has not been properly accomplished. It remains 'essentially incomplete' (Garfinkel 2002), as the embodied actions required to realise them are not carried out. By not following Will's instruction, the teacher avoids a shift over who gets to instruct whom. By this I do not mean the teacher has intentionally not followed Will's indications to purposely avoid this, but she was already working out a way of finding the code on her own. Thus, displaying competency in figuring out a solution without relying on the pupil's instruction, even though this instruction was requested. One may argue that through this encounter the teacher has learned about the relevance of classroom codes when instructing access to assignments and where to find the code, but she has also resisted a categorical shift. In other words, by not complying with the pupil's

directive, the encounter has not become one in which the teacher takes over the category of 'instructed' and the pupils the category of 'instructor'.

Repairing the teacher-pupil interactional asymmetry

> The teacher positions the arrow over a sequence of letters and numbers figuring next to the words 'Class code', below the class title, and asks, "is that it?". A couple of pupils respond affirmatively, and another pupil also attempts to contribute, "I think it's in the classroom code". But the teacher already clicks on a squared figure next to the code, a box emerges at the centre of the screen projecting the code on a bigger size and the teacher announces to the class, "there we are". Then the teacher raises her voice to call Sean's attention, "eh Sean?", she shouts, and announces in Welsh "you need this" ("*mae angen hyn*"). Some pupils from the teacher-focused group unsuccessfully attempt to repeat the Welsh phrase, the teacher repeats it loud and clear for the class and explains what it means – [Fieldnote extract 9]

Finding the code is the shifting point in the unfolding of this interaction. Once the practical problem of finding the code has been solved and the tension passes, the teacher takes up the task of reinforcing the classroom order. From hereafter her incumbency of the category teacher-that-instructs is ongoingly reaffirmed until the closure of the sequence. In a sort of symmetry with the beginning of the sequence, when Will stated that the ICT group "needs a classroom code", the teacher produces a closure by stating "you need this" and shows the classroom code to the ICT group. In other words, the teacher is now in capacity to not only provide the information they required, but to claim knowledge over what they *need*. Moreover, she specifically addresses Sean, the pupil she originally attempted to deflect accountability to in his capacity of 'digital leader'. This seems significant because, although the problem of access was reported as a collective issue by Will, by naming Sean, Miss Floyd is repairing the misplacement of responsibility, and reinforcing Sean's position within the group as 'digital leader'. Now, he has the classroom code and can write it down for the future if needed again.

Furthermore, Mis Floyd tells pupils what they need by *translanguaging* (i.e., alternating the use of English and Welsh), and thus exercising a ground she is more comfortable on, the Welsh language. We see what "*mae angen hyn*" means as the teacher translates it in her next turn, after a pupil attempts to repeat it. The instance of tension thus closes with the teacher competently instructing on what the expression means. She is, in a symbolic but consequential way, back in control.

The reckoning: Teachers' digital competence – a wider issue?

In an interaction that takes place later on that day, after the lunch break, when the class was engaging with a different carousel activity, the teacher offers an account of how she perceives her competency with technological issues.

Here we have Miss Floyd seated with some pupils at one of the tables, helping them to cut sheets for an activity in their Inquiry books. Whilst they cut sheets, they chat about people who build their own personal computers. Miss Floyd says that hers was built by two friends who are very "techy" and uses this occasion to justify why she is "not very good" at it and compares herself to one of the pupil's nan:

> "Yeah, I have two friends who are very techy. That's why I'm not very good, because they do all my work", says Miss Floyd. John answers by claiming he is "very into tech", unlike his nan, who does not know how to plug the wires of the TV. "I'm the same as your nan", Miss Floyd responds – [Fieldnote extract 10]

Miss Floyd recycles the category introduced by the pupil, 'nan', who in turn recycles a category introduced by Miss Floyd, 'techy'. This recycling resonates with Cicourel (1973, p. 55) assertion that 'talk is continuously folded back upon itself'. Part of this folding back process involves participants' awareness of the function of such categories at that time, and the way their invocation organises knowledge and local understandings of their own dispositions towards the use of technology in that conversation. Despite being a young woman in her mid-twenties, Miss Floyd associates herself with description provided by the pupil about her nan's abilities to solve technical issues. Which we could think may be

an exaggeration that Miss Floyd is using to create a juxtaposition between people like her (and the boy's nan) and techy people. The significance of this brief exchange is that it illustrates the sometimes-paradoxical situation in which the status of the teachers (as that who possesses the knowledge over everyday classroom activities) is counterposed by the reckoning of their limitations regarding technological matters. Although I do not suspect or suggest this is the case for all teachers, having attended workshops organised for teachers in which they were introduced to the DCF, low levels of confidence when it came to technological matters was a widespread feeling among many, as the following fieldnotes extract illustrates:

> Mrs Jones is providing a workshop for teachers around the regional consortium on the DCF. As an icebreaker activity she draws a line in the whiteboard and writes at the top "very confident" and at the bottom "not very confident" and asks the teachers to place a post-it where they consider their level of confidence regarding the digital technology is. The post-its agglomerate below a medium level, except for two young male teachers who place their post-its above. One of the teachers comments that she feels her pupils know more about technology than her. Mrs Jones responds that teachers' confidence is the bottom line of the workshops and of the work of the Digital Lead in each school, and she suggest taking advantage of the support available. Mrs Jones also comments on the importance of getting out of our comfort zone to learn; "that's when the magic happens" she says – [Fieldnote extract – 12]

This issue is not unique to teachers in Wales currently using the DCF and has been reported in the Ed Tech literature for at least three decades. Teachers' confidence and competence are, in theory, two sides of the same coin, and a lack of them has commonly been seen as a barrier to the *proper* integration of technology into schools. In other words, integration into the teaching practices rather than merely incorporating digital devices into the classroom furniture. For example, Zhao *et al.* (2002) suggest that to integrate technology into classrooms successfully teachers need to be *technologically proficient* (use technology competently), have a *pedagogical compatibility* (an understanding of how technology can contribute to learning), and possess a *social awareness* (an understanding

of social aspects of school culture). Furthermore, teachers' digital competence is usually articulated within the topic of teachers' attitudes and belief and associated to issues of professional development (Ertmer *et al.* 2012). Some authors, such as Riis (2017), argue that the main barrier, in this sense, is the lack of time and support to accompany an appropriate professional learning process.

> 'This learning process takes time, often a long time, which either creates an extra workload or takes time away from other tasks. Thus, the *potential* of new technologies is fundamentally dependent upon somebody taking the time to realise it and schools taking this challenge seriously, which means giving teacher due time for preparation' (Riis 2017, p. 388).

Part of the wider system reform in Wales includes changes to the accountability system, with a great emphasis on schools' and teachers' self-evaluation[59]. The reform of the educational system includes the creation of a new National Approach to Professional Learning, Professional Standard for Teaching and Leadership, and the Schools as Learning Organisations approach. The Welsh Government written approach to professional development is encapsuled in the following quote:

> 'Teachers should be the most dedicated students in the classroom. We will support them to be lifelong professional learners to help raise standards for all our young people' (Welsh Government 2017, p. 27)

Regarding preparing pre-service teachers, the reforms also include changes to the Initial Teacher Education (ITE) provision and a review and consultation on qualifications. All these aspects of the reform are, in principle, essential to address challenges associated with digital confidence and competence across the educational workforce (Crick 2020). However, the extent and way in which these reforms are enacting their aims in practice is yet to be realised. That is to say, it requiers further research and understanding.

[59] The Welsh Government has commissioned a series of self-evaluating tools. For example, 360 Cymru is a tool to help schools self-evaluate their online safety and digital learning journeys, including advice, guidance and signposts to further resources and support (Welsh Government n/d c).

4. Conclusion

This chapter has described and analysed an instance in which a group of pupils of a Year 5 class reported to their teacher they needed a classroom code – that had not been provided – to access their virtual classroom and complete an ICT activity. When the problem was communicated by one of the pupils to the teacher, a series of interactional tensions arose. On the one hand, the teacher needed to *come to terms with* the fact that she had not provided sufficient instruction and this insufficiency reflected her own knowledge. In this sense, there was a kind of inverted asymmetry of knowledge regarding the topic: what pupils *need* to accomplish their tasks.

On the other hand, once accepted that the classroom code was indeed what the pupils needed, parties of the scene oriented to the task of finding the code in a way that did not sabotage the *standardised relational pair teacher-pupil(s)* as the relevant organising device of the interaction. For example, Will, as 'the messenger', who was confronted with the challenge of telling the teacher she was wrong, acted in such way to avoid being seen as a challenging pupil. For this, he assembled and mobilised methods and evidence to assert the legitimacy of his claim and request. The teacher, on the other hand, was the only participant sanctioning contributions (e.g., children that were not previously selected as turn recipients), and she was the only one who took an evaluative turn throughout the scene (e.g., "Good job"). Pupils' talk, in contrast, was designed to avoid evaluation, even when their talk seemed to be correcting the teacher's, in the sense that their definition of the situation was finally imposed over the teachers'. Likewise, there are specific ways in which the teacher, despite having to rely on pupils' help to identify the problem and find the solution, formulated teacher's specific talk, e.g., she enacted her right to question the pupil's claim and finally colonised it. We saw this when Miss Floyd finally produces an instruction that mirrored the pupils' initial request for the classroom code ("you need this"). Consequently, although turn-produced pair categories such as *instructor-instructed* emerged throughout the interaction, participants ongoingly accomplished the relevance of the pair *teacher-students* to the organisation of the scene.

The instance also documented the teacher doing non-standard classroom talk, for instance, she asked genuine questions and requested instructions, whereas the pupils did a lot of work to help her produce instructional repair, for instance, indicating what was needed and producing suggestions. The analysis demonstrated how examining in detail the sequential and categorial organisation of the classroom encounter could help locate instances in which digital or technical competency becomes a problem for the teacher, and by extension, for the class. These kinds of scenarios can be seen as instances in which the teacher's control of the educational situation as a pervasive feature of the setting is challenged, bringing to the surface a texture of categorial possibilities with practical and moral implications. I have referred to these possibilities as problems in classroom order that teachers and pupils orient to repair.

Educational technologists are often concerned with proving how technology improves or enhances education tend to talk about a shift in teacher and student roles in a very positive way, fail to study how digital technology affects classroom orders. For example, McKnight *et al.* (2016) talk about the potential that technology provides for shifting the traditional roles of teachers and students: teachers becoming facilitators and pupils' active learners. The argument is that technology enables a shift from a teacher-centred to a student-centred education (Glassett and Schrum 2009). However, the potential *shift* descried in this chapter is of a different kind. The participants' distribution of knowledge regarding the topic of 'classroom code' poses the threat of a categorial shift (i.e., a teacher that is instructed and pupils that instruct), which participants orient to as an unpreferred option. The case studied here is a small, everyday instance, but provides an example of how a problem emerges and with some interactional effort is it also solved.

I do not intend to put forward an argument against technology in the classroom. Instead, it is an argument for the recognition that the DCF is a learning journey for teachers as well as for pupils, and as with most journeys challenges emerge and need to be overcome. Furthermore, teachers' digital competence is a potential source of professional anxiety that needs to be considered in the context of a national reform that expects from all teachers in Wales to transform their teaching practice – for some in very radically different ways than what they have been used to so far. As pointed out at the beginning

to the chapter, 'technology will not go away, and educators have to come to terms with it as an educational tool' (Cuban 2001, p. 194). The kind of changes that this curricular reform is after, such as the use of digital technology, will create situations that will challenge classroom dynamics, and it may provide for occasion in which students may know more about a particular technological matter than their teacher. These are situations teachers will have to come to terms with. Here is where appropriate training and support is so fundamental to the success of this reform. The extent to which the curricular reform is addressing these issues in practice is a research question for future studies.

In what follows, I conclude this thesis with a discussion of the main contributions of this study, its weaknesses, and strengthens. I also point at what I consider to be imperative to better understand the enactments of the DCF and the digital as a matter of competence in the classroom.

Chapter 7: Discussion

> 'The fact of the matter is that whatever else may happen in schools, whatever far-reaching or revolutionary educational issues may be exhibited or addressed there, the routine, mundane practical activities are fundamental' (Payne and Cuff 1982, p. 3).

The analytical aim of this thesis has been to render the common, apparent, and ordinary analytically significant. That is: in the face of the development and implementation of a cutting-edge educational reform, presented on paper as revolutionary, holistic, comprehensive, out of the ordinary, new, and shiny, we must remember that the most recurrent and biggest finding of classroom research is that '[w]hat policy makers, politicians, head teachers or governing bodies think is happening in classrooms simply is not what actually goes on' (Delamont 2016, p. 9). To understand what is actually going on we need to look at the stuff that makes up most of what goes on day by day, that is the mundane.

In this thesis, an attention to the mundane has materialised into the documentation of instances of teaching and learning digital knowledge and skills as it is locally exhibited on each occasion. This analytical sensitivity has enabled the production of an ethnographic account that describes the ways in which teachers' and pupils' actions collaboratively produce knowledge regarding digital objects and software use as classroom-specific-work. For example, Chapter 4 examines the production of subject knowledge by associating terms and evaluating displays of understandings. This analysis details the properties of the pedagogical dialogue as it is locally produced to accomplish the introduction of a technical term to the class. Chapter 5 focuses on the verbal and embodied instructions elaborated to teach on the use of a software to accomplish a classroom task. The chapter accounts for what is practically involved in the production of such instructions. Finally, Chapter 6 exhibits the details of the production of a repair of a teacher's instructional deficiency and the interaction work that is put into managing challenges to the classroom order that this shortfall creates.

This thesis does not offer a full account of the school or the school system in Wales, nor of the implementation of the DCF beyond the three instances analysed throughout the chapters. The study did not set out to explore whether the students actually learned digital competence by meeting the assessment criteria of the classroom activities. Instead, I provide a partial account of classroom activities, in which the DCF is seeable as being enacted. In a way, the intention has been to open up the blackbox provided by the DCF, as it occurs in specific settings and times. The focus has been on the way teachers engage in instruction, recruit pupils' participation, and work with a variety of technologies to make digital competence visible and learnable.

To analyse the instances of DCF enactment I had available through my fieldnotes and recordings, I borrowed from Garfinkel's (2002) insights into instructions and instructed action and subsequent contributions. The analysis is equally informed by studies of classroom interaction (Delamont 1983) and classroom order (Payne 1996; Mehan 1979; Hester and Francis 2000; Macbeth 2011), and membership categorisation analysis (Hester and Eglin 1997; Fitzgerald and Housley 2015). The analytic strategy has consisted of considering that the participants are the first analysists of the scene (Garfinkel 2002; Moerman 1988; Macbeth 2010), using their actions as instructions to conduct the analysis. Additionally, ethnographic details have been brought into the analysis for the production of an adequate description, where recognisability and plausibility are the guiding principles. That is to say, ethnographic details were included when they were implicated in the participants actions and therefore relevant to understand the scene. Finally, I have also relied on various *sensitising concepts* (Blumer 1954) borrowed from STS – such as 'blackboxing' and 'affordances' as interactional accomplishments (Vertesi 2019) – to think about the use of technology in practice.

In what follows, I synthesise the findings of this study by using the research questions raised in Chapter 2, I do not provide perfect and complete answers, but use these intertwined questions as prompts for discussion. I then reflect on what the study has accomplished or missed and conclude the thesis with some final remarks.

1. What is practically involved in the enactment of the DCF?

The analysis conducted throughout the findings chapters has shown that an important part of this enactments involves some sort of *instruction* and *instructed actions*. These terms, however, gloss over a variety of activities. If we zoom out from the detailed analysis of classroom interaction, the first instruction we may want to consider is the DCF itself. The DCF is a policy, a tool, a written document, but it can also be seen as an instruction. The framework instructs teachers on how digital competence can be developed within schools. Indeed, the framework proposes a series of *progression steps* to develop skills, knowledge, and attitudes to – in theory – make students confident, creative, and critical users of technologies and digital systems (DCF Guideline 2016, 2018).

However, as it has been argued, instructions do not unilaterally determine instructed actions, but they acquire a sense through being followed, and that is a creative endeavour (Braun *et al.*, 2011). Teachers *read* – and therefore have to interpret (Grint and Woolgar 1997) – the framework's precepts and translate them into a variety of classroom activity. By those terms, the DCF can be seen as a technology with *interpretive flexibility* (Collins 1981; Pinch and Bijker 1984). That is to say, to enact the DCF requires interpretative work. Nonetheless, this is not a finding in itself, as the DCF and the whole curriculum have been designed as tools open to interpretation and adaptation to schools' needs and contexts (e.g., the learning abilities of the pupils, the themes of enquiry they have been working on, the time the class has, the technological artefacts the school has available to them, and so on). In this regard, the contributions of this thesis involve detailed accounts of what is practically involved in accomplishing DCF enactments in the classroom, i.e., how digital competence *is* taught in practice, rather than how the paper establishes how it *should be* taught.

For example, Chapter 4 illustrated an instance in which the enactment of the DCF is accomplished through a closely curated pedagogical dialogue, within which a teacher introduces the notion of a database to her class. The competent use of databases is stipulated as part of the data and information literacy requirements of the DCF. However, before creating or using a database, the teacher deems it necessary to instruct pupils about

what a database is conceptually, as an ideal object of knowledge, and in association with an empirical object of knowledge (Skyscanner). The instance explored in this chapter shows how the teacher sets up a *participation framework* (Goffman 1981) by which pupils' contributions to the dialogue are requested and the adequacy of their responses assessed.

The analysis shows the way the pedagogical aim of introducing the class to the notion of a database is accomplished through what could be identified as a mix of heuristic and constructivist pedagogical dialogue that distinctively follows the three-turn sequence structure: (i) teacher's question, (ii) pupil's response; and (iii) teacher's comment. More concretely, the analysis shows the methods by which teachers facilitate *learning* by instructing pupils to turn their thinking into publicly available objects and to subject these objects to evaluation and ratification. In other words, the dialogue enables the creation of objects to work with to add texture to the lesson and move it forward. In a way, *objectivation* (Liberman 2018) can be seen as one among the series of practical operations – or *microsocial phenomena* (Latour and Woolgar 1979) – that forms the everyday activity of teachers and pupils in the classroom. Practical operations by which notions of the digital are produced, superimposed, backed up, or dismissed as a matter of situated practice (even though these operations are very unique to classroom settings, as opposed to, for example, scientific labs). Therefore, one may argue that a way to introduce technical terms to a class is to engage them in a pedagogical dialogue that demands from the pupils to participate in objectivating practices actively, rather than just listening the teacher speak.

The teacher curates a pedagogical dialogue with the pupils, which shapes the production of an understanding of database as an object of knowledge. The pupils' contributions enable the production of teacher's ratifications, introduction of occasioned rules, and corrections of pupils' understandings of the topic. One could argue that this is where most of the teaching occurs. Whilst corrections in other interactional situations have a function often associated with some sort of repair, in educational settings, they are strongly tied to accountable pedagogical aims. Through the production of corrections, the teacher exercises her preference for a certain understanding of the world (Mackay 1974). These turns are sequentially and categorically organised. Only the teacher produced them and

only in special moments of the interaction. In this sense, the database as an object of knowledge is created in the classroom through methods specific to, and dependent upon, the classroom's history, shared knowledge, interactional order, and specific educational purposes. Consequently, the correctness of such knowledge is always locally, situationally, practically defined, and occasioned as 'some local gang's work affairs' (Garfinkel 2002, p. 182).

By using the term *occasioned* throughout this thesis, the intention has been to emphasise the way features of socially organised activities such as lessons, are temporally situated and reflexively accomplished through the work of parties to the activity (Zimmerman and Pollner 1971, p. 94). Rules, structures, and orders are not conceived to be standing prior to and independent of the occasion in which they are made relevant as practical organising principles. They are not to be understood in any universal sense – not even the notion of commonsense – but according to the locally formulated pedagogical activity, for that class, at that time, with those resources at hand.

There are also other rules associated with the interactional order of the classroom, such as who (as in which membership category) should participate in which way (category predicates), which are somehow tacit (i.e., not made explicit but operating omnirelevantly). Thus, when the teacher asks a question such as "who can remember the name of the website?", there is the expectation that pupils will self-select themselves as next speakers. These features of the classroom order are also locally accomplished, through an *in vivo* and ongoing production of instructions that provide clues about how to participate in the dialogue, as well as how to produce 'correct' knowledge. This feature, although it is an important aspect of the teaching of digital competence in classroom settings, is not unique to enactments of the DCF, but it is found in analyses of classroom lesson throughout the literature (e.g., Mehan 1979; Macbeth 1991; Freebody and Freiberg 2000). However, as discussed in Chapter 6, categories and their predicates are not fixed even within an interaction. The *categorial landscape* (Jimenez and Smith 2021) of any given activity is dynamic and shifting both in terms of its categorial relevancies and just how those categories organise the assembled production of the activity.

One of the findings of this thesis is that the interactions composing the educational encounters studied reflect the kind of asymmetrical relationship widely described in the literature – as shown in Chapter 2 – and, in this sense, teaching is *business as usual*. The analysis shows the ways in which knowledge about how to interact in the classroom – among other kinds of knowledge – is implicated and articulated in the task of producing *correct* subject knowledge, and how it constitutes an essential aspect of the accomplishment of the lesson. In this sense, the thesis demonstrated the ways that teachers and pupils draw upon knowledge about classroom order, and the rights and responsibilities attached to the incumbency of categories such as 'teachers' and 'pupils' in the classroom. In other words, participants orient to the ways in which the two groups of actors are expected to contribute to the dialogue. For example, the teacher enacts her authority over the learners, by carefully monitoring turns (either by naming the children, pointing at them, or directing her gaze at them), evaluating, correcting, and ratifying the children's contributions. Thus, in a way, although a lot has changed in terms of educational practice in the last few decades (e.g., the implementation of more constructivist pedagogies and discovery/enquiry-based activities), some things remained just the same (e.g., an asymmetrical relationship between teachers and pupils).

2. What role does technology play in the DCF enactments?

Theoretically, *technology* is an empty concept in the sense that it can be filled up ambivalently. Authors such as Mackenzie and Wajcman (1985) have described it as *slippery* term as its boundaries with other human activities (science, art, economy, and for that matter, education) are unclear. Technology has also seen as an *elastic* concept; if taken to an extent, 'everything is technology' (Braudel 1985, p. 334). The digital devices in the classroom such as laptops, TV screens, the software used, the DCF, and even pedagogy can be seen as technology. Whitehead (1929, p. 4), for example, defined education as 'the acquisition of the art of the utilisation of knowledge', a notion that evokes both a sense of instrumentation and artfulness.

In this thesis, I have intentionally left out addressing the topics such as *what is technology*, to focus on the role that some digital artefacts play in the enactment of the DCF which,

in turn, refers to how digital devices are used in practice (both hardware and software), but only as long as they are implicated and in an instance of DCF enactment. The reason for this exclusion has been justified through my analytical preference towards grounding the analysis and discussion in the data. Thus, detailed ethnographic accounts of actual instances of practice from the perspective of just another member have been privileged over theoretical abstraction. Consequently, in this thesis, the term 'technology' has largely been used in relation to what instructions are about (e.g., the use of Google Docs or Just2Data) and the medium by which instructions are enacted (e.g., laptop and the screen).

In the context of looking at what is practically involved in the teaching of digital competency, this approach to technology can later be seen as a *relational* approach, closer to topics of *performativity* (Butler 1993), *enactment* (Mol 2002), or *mediation* (Livingstone 2009). This is seen in the way technology has often been described in this thesis in instrumentalist terms, as tools used for educational purposes (although, of course, not uniquely), e.g., as interfaces of mediation between demonstrations and instructions or as the digital environments or spaces that participants need to navigate to accomplish a educational outcome. This way of treating technology could be associated with the *material turn* in STS as it attempts to address the way that objects are enacted in practice (Mol 2002), without neglecting issues of representation or knowledge. In this sense, *materiality* is understood as constitutive of and constituted through social practices, rather than as a taken for granted bedrock reality.

For example, Chapter 5 illustrates how the details of instructional sequences (and their specific content) are produced reflexively in and through the teacher's and the pupils' engagement with one another and with technology throughout the course of the lesson. This is because to produce adequate *in vivo* instructions in the kind of educational situations this chapter describes (i.e., instructions for an ICT independent learning activity) demonstrations are essential. Demonstrations become the visual exhibition of the instructed action. Throughout these demonstrations, the material and virtual affordances and constraints of technology are seen as emergent, produced, and made perspicuous. As such, software affordances are articulated in this thesis as just another interactional

contingency that participants work with – and sometimes around – to accomplish desired educational outcomes.

Furthermore, the analysis conducted throughout this thesis supports the idea that technology has no inherent qualities and that the interpretative work that humans engage establishes what artefacts 'actually are' in each situation (see Grint and Woolgar 1992, 1997; Woolgar and Cooper 1999). From this perspective, what we encounter as digital objects (such as a database) could be understood as 'simply the outcome of interpretive accounts' (Selwyn 2012, p. 86). As discourse is indexical and therefore requires some levels of interpretation, the intelligibility of *the digital* as a discursive phenomenon is always tied to an interpretative work. This is not to be understood, however, as if people interpret and then get a meaning out of the interpreting, as if these were two separate stages of a process. As Mair and Sharrock (2021, p. 23) remind us, action and meaning are 'internally related'.

Hence, to produce, use, and discuss digital technology involves the ongoing actioning of meaning. As ethnomethodologists have frequently demonstrated, meaning is not private nor subjective but is publicly available and methodically achieved through members actions (Macbeth 2010). Moreover, the properties that are integrated into the construction of the instructions are not fabricated out of the blue, but out of the publicly perceptually available elements of the scene (which include elements such as the built-in features of a computer programme). Therefore, although an account of the use of the technology in the classroom cannot presuppose inherent qualities, we need to recognise that whatever *interpretation* may be produced *in situ,* it is tied to the circumstances of its production, which may include the material and virtual features of the technology as well as shared methods for locating and objectivating these features as matter of mundane, ordinary practice.

In sum, this thesis contributes to the growing body of work looking into technology in use in classroom settings. More concretely, it details the interactional work involved in producing instruction with technology, as well as instructions on the competent use of technology. The thesis demonstrates the way technological features emerge as working objects as the teacher explains what to do with them for the purpose of accomplishing the

task at hand. The analysis has aimed to escape different kinds of determinism by dismissing ideas of the social, the cultural, the technological, and the cognitive as some sort of fixed set of factors determining instances of conduct as from outside. Instead, it has prioritised the figuration of *lived details* (Garfinkel 2002). These details are not just random selected features of the setting extracted for a particular analysis, but they coincide (seeable from the perspective of another member) with the 'witnessable structuring of an activity through which an in which the identifying details of that activity are recognisable' (Livingston 2008, p. 841). Thus, what an ethnomethodological approach suggests is that the details of activities and settings are available through the observability of such the specific of just *any actual case* (Garfinkel 2002), including that of the use of technology in any other setting.

3. How are notions of digital competence accomplished in the classroom?

Given that the process of producing the DCF has been ambivalent regarding establishing rigid definitions of what digital competency may mean, this thesis has not presupposed notions of digital competence. Following an ethnomethodological orientation to the study of meaning in actions, the assumption, however, has been that we can look at what and how certain notions of digital competence take shape in practice, in particular settings, for specific educational purposes. Analysing these settings and purposes has been one of this thesis's aims.

For example, Chapter 4 shows a teacher deeming relevant to teach the class how to understand what the term 'database' stands for, before instructing on how to use Just2Data to make one. The teacher frames the topic of this lesson as essential for pupils at that point in their educational trajectory: "when you're in Year 6, you need to start thinking about databases". By prioritising the educational outcomes in such way, the teacher realises a particular way of accomplishing digital competence as a pedagogical aim. In other words, to be digitally competent is not just about technique (knowing how to use the technology), but it also consists of having the language knowledge that allows to articulate competent understandings about these objects. This aspect of digital

competence, however, is not explicitly stipulated in the framework as an educational aim, hence it may better be referred to it as part of the *hidden* curriculum.

In contrast, the instance studied in Chapter 5 shows the enactment of a *manifest* aspect of the curriculum. It is a finding of this chapter that instructions for classroom tasks enacting the DCF are produced to locally objectivate predicates of digital competency (in this case, to create a Google document where information such as 'pros and cons of using animals for entertainment' is competently gathered and presented). Moreover, the articulation of the activity specificities yields the details by which digital competency is reconstructed as a sequence of practical actions. Consequently, to demonstrate digital competence is to demonstrate an understanding of the instructions and how to follow them.

Furthermore, the analysis examined the ways in which members of the scene shaped instructions and the way the priorities of the DCF were assembled and realised as a matter of *technique*. As with the learning of other skills (e.g., craft knowledge, artistic performance, and sporting prowess), digital competency is not completely cognitive, but a matter experiential knowledge and body technique – in other words, knowledge of doings that involves embodied, experiential, and tacit understandings, as well as more conventionally cognitive knowledge. The chapter shows how these knowledges are implicated in the production of a sequence of instructions, crafted collaboratively, *in vivo,* embodied, and oriented to the phenomenal field made available by digital technology (both hardware and software). The analysis details how the teacher and the pupils *worked* together (although not without challenges) to make digital competency visible, accessible, and reportable *for-all-practical-purposes* (Garfinkel 1967).

The analysis conducted in Chapter 5 also allows considering what is further involved in producing activity instructions. For example, how participants deal with its indexicality. A detail observation of the encounter demonstrates that inasmuch as instructions show indexical properties, posing problems of clarity, consistency, completeness, followability, and factual adequacy (Garfinkel 2002), it is the teacher's job to repair them – at least enough as to make instruction practically followable. The demonstration of embodied technique applied to technology manipulation was a key method for accomplishing this

work. By demonstrating the followability of the instructions, the teacher produced an *in vivo* and embodied description of the process of accomplish the classroom task. Another key method consisted of *sequencing* (Greiffenhagen 2008) or breaking the task into operable steps and formulating those as directives (as a recipe or a manual). This type of instruction was facilitated when it came to the topic of software use (e.g., how to get from Google for Education main page to a blank Google Doc, or what to do in Google Docs).

However, not all activities were subject to such instructive breaking down; in fact, a lot of steps were glossed over (e.g., what to actually do with your body to manipulate the hardware of the computer). The extent to which certain skills are intrinsically tacit, however, needs to be challenged. In this sense, a critical examination of when a blackboxed activity would need to be open is a topic of future research. In particular, an exploration of the ways that the settings and its characteristics (a class's educational trajectory, learning needs, teacher's digital competence and so on) can tell us something about the apparent indeterminacy of knowledge and skills required on each occasion. As it was emphasised throughout the thesis, it is important to consider that the study centres on a formal setting for early years mandatory education, where – among other features – there is an age gap between instructor and novices.

This thesis demonstrated that as the technology (from the laptop to the software suite) becomes a tool to accomplish the activity, the activity in turn becomes an opportunity to develop an experience of using such technology competently. To do so, the teacher implicates and mobilises a variety of already-acquired skills and knowledges (from procedural knowledge, such as how to manipulate the laptop, to substantive knowledge, such as what a 'pro' and a 'con' is). The teacher regularly and unproblematically produces instructions that inevitably rely upon assumptions regarding pupils' shared knowledge, including that of body techniques for technology manipulation. However, the embodied knowledge required to manipulate the technology effectively is taken-for-granted and excluded from instructional detail. In this sense, it is worth noting that not only the way the computer works is blackboxed, but what the body does with the technology is also blackboxed.

Pupils have access to the product of these embodied actions through the screen, but they are left to reconstruct those actions on their own. Metaphorically, the teaching of digital competence involves almost as many layers of code[60] as layers of tacit knowledge, and only when there is a breach to the smooth running of technology and of the instructions, these blackboxes are opened. One clear observation in this regard is that some blackboxes do not need to be open in order to develop competency. On the contrary, the development of digital competency partially relies on using *blackboxes* unproblematically. This idea challenges notions of lay and expert knowledge regarding technology use and notions of computer literacy based on a user's *deficit model*. In other words, that if people cannot accurately explain the workings of the 'blackbox' they will lack adequate competence. In this regard, the analysis reveals the relevance of mundane practical knowledge for the development of digital competence.

Chapter 5 also showed the wat classroom task instructions are sequentially and categorically organised. That is, the teacher is in control of who gets to formulate operable steps and demonstrate them at every stage throughout the lesson, and the analysis documents just how this gets done. Moreover, it showed that when the teacher cannot perform this task there is a breach in the classroom order. It is through category-bound verbal and body actions that setting the classroom task is locally and practically accomplished; each operating as a sense-making device for students to realise a local understanding of what it meant to be digitally competent in that particular scenario. Thus, although there is an impression that the enactment of the DCF will provide conditions for pupils to "lead activities" and become "facilitators" (in Mrs Jones words), the *real power* still lies in the teacher's hands (Delamont 2014).

This attention to the locally produced orders is important to understand a policy in any *actual* occasion of practice– 'just here, just now, with just what is at hand, with just who is here, in just the time that just this local gang of us have, in and with just what the local

[60] Software suites such as Google for Education or Just2Data are built upon layers of codes, organised by hierarchies of abstraction. Thus, lines of code created by some engineer with a certain knowledge, at a certain time and space are blackboxed and reused by other programmers – for example, often they use chains of code borrowed from code libraries – and blackboxed again and again.

gang of us can make of just the time we need, and therein, in, about, as, and over the course of the in vivo work' (Garfinkel 2002, p. 99). Thus, this thesis has documented the lived details that classroom-specific-work, as endogenous phenomena, ongoingly accomplished through the participants actions and orientations.

4. What kind of contingencies arise?

The thesis shows the ways in which the DCF is enacted through the instruction and accomplishment of classroom activities that involve the use of digital technologies – such as the ICT independent learning activity described in Chapter 5. ICT independent learning activities were a stable feature of everyday classroom life; always one of the carousel's stops that organised time in the classroom. The inclusion of these activities meant that the teacher could break the class into smaller groups. This is often the sense in which educational technologists have to refer to the role of technology as supporting or enhancing more student-centre pedagogies.

However, the extent to which independent learning activities are successful in engaging pupils in learning processes needs further research. As Chapter 6 showed and I observed on different occasions, pupils may struggle with a variety of aspects of the task (including accessing their assignments) that are sometimes left unattended. What I also observed, nonetheless, is that the teachers often resource to technology to manage pupils attention in the classroom. For example, the pupils who finished their tasks earlier were often sent to the sofa area with a laptop to "play" with Mathletics or Spellodrome (both software packages designed to encourage independent learning, one focused on maths and the other on literacy), whilst the rest of the class finished the activity. That instruction was designed to keep pupils busy and entertained, instead of hanging around the classroom potentially distracting other pupils in their tasks.

There is no doubt that managing a class is a very demanding job, that requires teachers to strike an adequate balance between controlling pupils' behaviours and encouraging them to participate. This execution requires various kinds of competence (e.g., pedagogical, but also technological). In this sense, contingencies may arise in various

forms (e.g., from having a challenging group to having technical issues with digital devices). Therefore, many situations might take place during classroom activities that may constitute a problem for the natural unfolding of planned activities, and thus the enactment of the DCF in the classroom. Indeed, the occurrence of unplanned events is a recurrent feature of classroom life (e.g., from the absence of a teacher assistant to the classroom ceiling collapsing, as happened one day during fieldwork). One of the most predominant situations that affect the unfolding of planned activities relates to pupils' ability to access their online assignment – especially when they have to do it independently. Sometimes, the internet connection is too slow, there are problems with the server, or devices are nowhere to be found. Frequently, pupils would forget their email addresses or passwords, or they would struggle to spell these to login into their Hwb accounts. Less frequently, teachers fail to produce adequate instructions, the instance described in Chapter 6 is one of these rare occasions. Issues of access not only pose problems for the pupils in completing their activity but also translate into disruptions to the teacher's activities during their focus group session, as examined in Chapter 6.

Moreover, these kinds of issues can create a series of interactional tensions. For example, as Chapter 6 illustrated, the teachers must come to terms with the fact that they have not provided sufficient instruction and that perhaps pupils know more about something that is expected to be the teacher's domain of knowledge. The chapter demonstrates how examining in detail the sequential and categorial organisation of the classroom encounter can help locate instances in which the teacher's digital competency becomes an issue for the accomplishment of the educational situation. These kinds of scenarios can be seen as instances in which the teacher's definition of the situation, as a pervasive feature of the setting, is challenged, thus bringing to the surface a texture of categorial possibilities with practical and moral implications. It was argued that against the backdrop of educational order, these situations can create ambiguity and potential professional anxiety.

It is common that teachers facing curriculum change need to equip themselves with new subject knowledge and appropriate pedagogies for delivering these (Sentance and Csizmadia 2017). Yet, in the case of having to use and develop digital skills across the whole curriculum, teachers are expected to become digitally competent themselves, not

just to acquire the knowledge they ought to teach, but in learning appropriate pedagogies for delivering this, teachers need to be able to use digital technologies as educational tools. In a way digital competence becomes both the means and the end. This aspect of professional development seems particularly relevant considering the history of the ICT subject in the UK, characterised by the deterioration of the subject's reputation partially due to a lack of adequate ICT training for teachers, and the history of teachers' autonomy over curricula content.

As the study took place early in the roll out of the framework, we may wonder whether things have changed since then. Perhaps teachers have become more familiarised with the DCF and the New Curriculum, or the incorporation of a new workforce trained in accordance with the demands of the new curriculum may be contributing to raised digital competence across schools. Nevertheless, the professionalisation of teachers is a process (Helsby 1995), i.e., a professional status cannot be acquired once and for ever but requires ongoing development (Abbott 1988). In this regard, an area that this study identified as important but not fully developed is the topic of professional development. If adequate support and training is not provided, we may be at risk of committing past mistakes.

5. Study limitations and future research

There are various ways in which a study of the DCF in practice could have been done, and the analysis conducted here was only one of them. I could have chosen, for example, a different scope and looked in more detail at the work that Digital Leads do to integrate the DCF into the schools' practices more widely. I could have asked teachers, or even students, for their views on digital education and the ways they perceived it as being enacted, or I could have used a different set of concepts and ideas to articulate the findings of the study. I could have also focused on different cases or instances of the enactment of different strands of the DCF (e.g., Digital Citizenship or Computational Thinking) in the classroom or focus my attention on different aspects of classroom life (e.g., the work pupils do when accomplishing their classroom tasks).

In this sense, this thesis is shaped by a mix of intellectual inclinations, interests, and gaps in the literature. For instance, in studies of the use of technology in the classroom, students' (cooperative) work has been a main focus of research (e.g., Greiffenhagen 2012; Maeder 2012; Birmingham *et al.* 2022), whilst less attention has been paid to teachers' work; especially observations of actual practice, rather than accounts of teachers' views and beliefs on technology (e.g., Ottenbreit-Leftwich *et al.* 2009; Ertmer *et al.* 2012; Riis 2015). The thesis is also strongly shaped by circumstantial constraints. For instance, the fieldwork was conducted at the very beginning of the rolling out of the framework. The full curriculum had not even been made available then. Therefore, we can assume that there is a good chance that many aspects of DCF enactments may have changed in the past years, especially after the experience of blended learning during the Covid-19 pandemic. Furthermore, because of the disruption of the fieldwork caused by the pandemic lockdowns, my observations concluded long before I expected them to end, which meant I could only analyse a very limited number of cases. Thus, although a thesis will always constitute a partial account, there are many aspects about the DCF that this thesis falls short to address.

Throughout this chapter, I have pointed out some under-developed areas in this thesis. However, digital curriculums, as objects of ethnographic enquiry, need further research and here I propose at least three more lines for future studies: (1) students' daily entanglements with digital technologies; (2) unintended consequences of the way the digital curriculum is being realised; and (3) the adaptability of the framework to rapid technological changes.

A shortcoming of this thesis is that it has not integrated an account of students' daily entanglements with digital technologies beyond classroom activities. This was originally intended, as the purpose was mainly to understand what was involved in the teaching of digital competence. However, teaching and learning is a two-way-street, and an understanding of the process from the students' perspective would help better understand the implications of the enactments of the new digital curriculum. A focus on pupils' perspective will contribute to, for example, identifying what challenges are faced in becoming digitally competent according to the curricular standards students face. The

extent to which enactments of this curriculum contributes to maintain, reproduce, or alleviate social inequalities should also be examined. In particular, the way the possibility and conditions for using digital resources that different individuals in different settings have may affect the performance of these pupils according to the curriculum standards. Too often, technology has been placed as the solution to educational deficiency, whilst problems of funding, overcrowded classrooms, and overworked teachers remain marginal to the proposed remedies.

In terms of unintended consequences, we may want to think about the concerns raised in the previous section regarding teachers' digital competence and professional anxiety. Or we may want to take a more STS approach and consider that any technological innovation carries the risk of unintended and unexpected consequences, which sometimes have had great impact on moral and legal issues, such as the criminal misuse of digital technologies (Berry 2018)[61]. Therefore, it is necessary to bear in mind that although, in theory, technologies are introduced to increase efficiency or more democracy and freedom, the history shows us that this is not always the result (Winner 1986)[62]. In this regard, it is critical to examine the way the enactment of the DCF and, particularly, the use of the Hwb, as the platform *per excellence* to enact the DCF, may contribute to the process of datafication in education and what gets done with that data. It is essential to reflect about the practical and moral implications of data practices of Ed Tech companies (such as Google for Education) involved in the curricular reform. Especially when all the teachers and students in Wales are urged to use Hwb and the apps included in it.

[61] For example, the architecture and design of the Internet created a hidden web (known sometimes as the Deep Web, Deep Net, Invisible Web, or Dark Web), which individuals can only access using a special software such as The Onion Router (TOR). This software was initially created by the U.S. Naval Research Laboratory as a tool for anonymously communicating online, but it has partially ended up being used for criminal activity or issues that people want to keep secret (e.g., Ashley Madison database case, see Weimann 2016).

[62] Arguably the most evident case is the splitting of the atom and Oppenheimer's famous quote 'I am become death, the destroyer of worlds' - a line from the Hindu sacred text the Bhagavad-Gita (Temperton 2017).

Finally, when discussing future research, it is almost inevitable to think about how technology might radically change digital education. In this regard, an under-researched, but rapidly emerging area of research, is that concerning the impact of recent developments in AI-based programmes, such as ChatGPT, in professional environments. For example, one of the concerns that has started to crop up relates to the challenges for digital education. AI-based technology, attempting to mimic human creativity, can be seen as sources of concerns regarding what is unique to human action and human jobs created by and for humans in a wide range of industries. If the skills we are training our pupils in will not be required for the jobs of the future, would things such as the DCF need to be rethought sooner rather than later? This is perhaps one of the most dramatic and speculative *latent future* or *future-in-the-making* (Adam 2011; Adam and Groves 2007) we currently face. That is to say, something that is-yet-to-come, that has not even happened, but has the potential to influence strongly current courses of action.

6. Final remarks

To conclude this thesis, this final chapter has discussed the contributions of this ethnographic study by exploring how the DCF is enacted, in particular, what is practically involved in the enactments of the DCF observed, the role of technology, how notions of digital competences were accomplished in the classroom, and what sort of contingencies arose. The discussion has also identified the shortcomings of this study and various different lines for future research. The discussion has brought together tropes and sentiments from STS, the sociology of education, and digital sociology as the classroom has been considered a site ripe for examining *the digital* as a discursive phenomenon, tied to setting-specific dynamics, practices of knowledge production, and technology use. This has primarily involved combining an ethnographic sensibility with an ethnomethodological orientation to the study of knowledge as an interactional accomplishment, along with the use of various *sensitising concepts* (Blumer 1954) borrowed from STS to think about the role of technology in DCF enactments.

This thesis described and analysed DCF enactments as manifested in classroom situated practice. That is, as the stuff that happens in the mundane everyday life of a primary

school's classroom. In doing so, this thesis has come to show that whatever the aims of a new policy, technology or framework might be – in this case the DCF – the realisation of that object is in the *doing*. That is, the DCF is practically accomplished. DCF enactments involve the work of translating digital competency from an abstract, undefined learning objective into something tangible, visible, and learnable. Thus, these enactments shape how digital competence is to be understood each time and for which classroom task-related purposes. This approach to the study of the DCF allowed a close look at how *the digital* is made intelligible to members of a classroom as a matter of competence, which in turn allowed the capturing of the discursive nature of *the digital*.

Although the idea of discursive phenomena can seem to imply abstractions, it is in fact a very *concrete* practice – in Whitehead's (1948, 1969) sense. Embedded in the setting and its features, the digital as a discursive phenomenon is entangled to the material world, both as empirical objects of knowledge and as activities that demand embodied actions. The concreteness of the digital as a constitutive feature of DCF enactments is shaped by the setting both at a school level and the minutiae of classroom interaction, the rubric of the observable patterns of culturally recognisable settings, and the endogenous nature of such phenomena; in its essence it is both *difference* and *repetition* – to borrow from Deleuze (1994), even if just the title. Thus, the DCF involves new pedagogies and subject knowledge that, to a large extend, rely on doing classroom life *as usual*. As Mrs Jones put it once in a workshop: "it's just tweaking what we've already been doing".

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Appendices

Appendix 1: The strands and elements of the DCF[63]

Citizenship	Through these elements, learners will engage with what it means to be a conscientious digital citizen who contributes positively to the digital world around them and who critically evaluates their place within this digital world. They will be prepared for and ready to encounter the positive and negative aspects of being a digital citizen and will develop strategies and tools to aid them as they become independent consumers and producers.	• Identity, image, and reputation • Health and well-being • Digital rights, licensing, and ownership • Online behaviour and online bullying
Interacting and collaborating	Through these elements, learners will look at methods of electronic communication and know which are the most effective. Learners will also store data and use collaboration techniques effectively.	• Communication • Collaboration • Storing and sharing
Producing	These elements cover the cyclical process of planning (including searching for and sourcing information), creating, evaluating, and refining digital content. Although this process may apply to other areas of the framework, it is of particular importance when creating and producing digital content. It is also essential to recognise, however, that producing digital content can be a very creative process and this creativity is not intended to be inhibited. Digital content includes the production of text, graphics, audio, video, and any combination of these for a variety of purposes. As such, this will cover multiple activities across a range of different contexts.	• Sourcing, searching, and planning digital content • Creating digital content • Evaluating and improving digital content
Data and computational thinking	Computational thinking is a combination of scientific enquiry, problem-solving and thinking skills. Before learners can use computers to solve problems, they must first understand the problem and the methods of solving them. Through these elements learners will understand the importance of data and information literacy, and they will explore aspects of collection, representation, and analysis. Learners will look at how data and information links into our digital world and will provide them with essential skills for the modern, dynamic workplace.	• Problem-solving and modelling • Data and information literacy

[63] As written in the official Welsh Government website https://hwb.gov.wales/curriculum-for-wales/cross-curricular-skills-frameworks/digital-competence-framework/2

Appendix 2: Ethical Approval Letters

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12 July 2019

Our ref: SREC/3378

Patricia Jimenez
PhD Programme
SOCSI

Dear Patricia,

Your project entitled *'A Digital Competence Framework in the making: Perceptions, cultures and practices'* has now been approved by the School of Social Sciences Research Ethics Committee of Cardiff University and you can now commence the project should all necessary forms of approval been received.

If you make any substantial changes with ethical implications to the project as it progresses you need to inform the SREC about the nature of these changes. Such changes could be: 1) changes in the type of participants recruited (e.g. inclusion of a group of potentially vulnerable participants), 2) changes to questionnaires, interview guides etc. (e.g. including new questions on sensitive issues), 3) changes to the way data are handled (e.g. sharing of non-anonymised data with other researchers).

In addition, if anything occurs in your project from which you think the SREC might usefully learn, then please do share this information with us.

All ongoing projects will be monitored and you will be obliged periodically to complete and return a SREC monitoring form.

Please inform the SREC when the project has ended.

Please use the SREC's project reference number above in any future correspondence.

Yours sincerely

Professor Alison Bullock
Chair of School of Social Sciences Research Ethics Committee
Cc: Carina Girvan, Jamie Lewis

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13th November 2019

Our ref: SREC/3378

Patricia Jimenez
PhD Programme
SOCSI

Dear Patricia,

Many thanks for advising the committee of the changes to your project entitled *'A Digital Competence Framework in the making: Perceptions, cultures and practices'* has now been approved by the School of Social Sciences Research Ethics Committee of Cardiff University and you can now commence the project should all necessary forms of approval been received.

If you make any substantial changes with ethical implications to the project as it progresses you need to inform the SREC about the nature of these changes. Such changes could be: 1) changes in the type of participants recruited (e.g. inclusion of a group of potentially vulnerable participants), 2) changes to questionnaires, interview guides etc. (e.g. including new questions on sensitive issues), 3) changes to the way data are handled (e.g. sharing of non-anonymised data with other researchers).

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All ongoing projects will be monitored and you will be obliged periodically to complete and return a SREC monitoring form.

Please inform the SREC when the project has ended.

Please use the SREC's project reference number above in any future correspondence.

Yours sincerely

Professor Emma Renold
Chair of School of Social Sciences Research Ethics Committee
Cc: Carina Girvan, Jamie Lewis

Appendix 3: Information Sheets

Teachers Information Sheet

'A Digital Competence Framework in the making: Perceptions, Cultures and Practices'

This is an invitation to be part of the research project *A Digital Competence Framework (DCF) in the making: Perceptions, Cultures and Practices* funded by the Economic & Social Research Council (ESRC) and the Welsh Government.

My name is Patricia Jimenez, and I am a PhD student at Cardiff University. The study forms part of my doctoral thesis, which focuses on studying the ways digital competences are being understood and taught in Welsh primary education. The project has been reviewed by and received ethics clearance through, the School of Social Science Research Ethics Committee (ref. SREC/3378). Additionally, as a member of the British Educational Research Association (BERA), I will ensure that all ethical aspects of the research comply with the standards of the BERA's code of conduct (BERA Ethical Guideline, 2018). For this purpose, I have also already had a DBS check on May 2019, which is to the school dispositions if required.

Further information which concerns this research project is outlined below. Please take the time to read through, and if you have any questions, do not hesitate to contact me.

What am I trying to find out?

- Digital Technology: This study will contribute to understandings of the ways in which we, as a society, are working out what digital technologies mean, how to develop our uses of it, and what knowledge and skills we need to educate our children in.
- Teaching practices: In particular, I am interested in studying the way in which digital skills and knowledge are being formulated and taught in practice.

How am I planning to do it?

- The study will be undertaken during the academic year 2019-2020.
- During this time, I will attend a variety of classes across Wales to understand how digital competences are being taught across subjects in Key Stage 2. This will include spending time in classrooms and having informal/conversational interviews with teachers.
- Also, I will seek to videotape and audio-record the teaching practices in action when informed consent has been granted for it. This digital data will not be made public. The aim is to help produce richer written descriptions the descriptions.

What will happen if you decide to take part?

- I will need your written consent, which will be subject to an ongoing verbal negotiation in order to ensure you are comfortable with the research at all points;
- You will determine when, where, and what is the best way to undertake the classroom observations (e.g. days, hours, when to use digital recording devices, etc.). I prioritise that participating in this research does not impose any further duties or stress to your already busy life.
- I will follow your advice on how to be introduced to the pupils;
- At that point, I will seek verbal assent from pupils to record their participation in the classrooms;
- Following school's advice, I will contact parents and guardians and provide an opt-out form in case they do not want their child/children to take part of the study.

- Confidentiality and anonymity will be offered at every stage of the research, including once the research has been completed.

- At any point, and for any reason, the school or any member of it can withdraw from the study without any prejudice;
- If any individual (either teacher or pupil) refuses to take part or decides to withdraw, I will immediately stop or restrict the processing of their data, and if requested I will erase any data collected concerning that individual from my files.

What happens to the results of the study?

- Physical data such as hand written fieldnotes, information provided by you or any other member of the school in paper, will be stored in a locked filing cabinet at Cardiff University. All electronic/digital data will be transferred to and stored on a password protected university computer network.
- No data in the format of video or audio will be made public.
- The findings will be shared in the form of doctoral thesis, presentations, reports, academic journal articles, and book chapters. If required I am happy to share those with the school
- After the end of the research, data will be retained for at least ten years or five years postpublication of the thesis.
- Further information about your rights with respect personal data is available from https://www.cardiff.ac.uk/public-information/policies-and-procedures/data-protection.

What involvement will pupils have?

Pupils are not the central focus of this study. Pupils' interactions with the teachers during the classroom observations might be recorded as long as they are relevant to the account of the teaching practices, but any data collected is not intended to describe pupils' behaviours.

What if there is a problem?

If you have any concerns regarding any aspect of this project, please feel free email me, and I will do all I can to answer your query.

If you remain unhappy or wish to make a formal complaint, please contact the chair of the Research Ethics Committee at the school of Social Science (socsi-ethics@cardiff.ac.uk) who will seek to resolve the matter in a reasonably expeditious manner.

Further information and contact details:

I can be contacted via e-mail (JimenezP1@cardiff.ac.uk). You can also contact my supervisor Dr Carina Girvan by email (GirvanC@cardiff.ac.uk).

Thank you for taking the time to read this information sheet and I hope you are considering taking part.

Kind Regards,

Patricia Jimenez

PhD Researcher
Cardiff University
1-3 Museum Place
CF10 3BD

School of Social Science
Cardiff University

Patricia Jimenez
PhD Researcher

Parents/guardians information sheet

'A Digital Competence Framework in the making: Perceptions, cultures and practices'

Dear Parent/Guardian,

I am writing to inform you that your child's teacher [name of the teacher] is involved in the research project *A Digital Competence Framework in the making: Perceptions, cultures and practices*, funded by the Welsh Government and the Economic & Social Research Council (ESRC).

The study forms part of my doctoral thesis, which focuses on studying the ways digital skills and knowledge are being understood and taught in Welsh primary education. In order to do so, I will attend to some of your child's lessons to observe the strategies [name of the teacher] uses to teach digital competencies.

Although pupils are not the focus of the study, any research carried out in a setting with children needs to be conducted with care and sensitivity. For this reason, and considering the parents/guardians right to know and accept changes in the children's everyday life, I am sharing with you this information sheet.

Please take the time to read the information outlined here.

What is the purpose of the study?

This study is an exciting opportunity for the school to engage in active research, which aims to have a positive impact on the coming future of Welsh education.

The topic of the study is relevant in the context of the upcoming implementation of the New Curriculum for Wales (2022). Part of the reform is to include a Digital Competence Framework (DCF) as one of three cross-curricular statutory responsibilities (alongside literacy and numeracy).

By describing the current teaching practices on digital skills and knowledge, the study aims to contribute to what we know about digital technologies and education, and thus inform these upcoming changes.

What will your child be asked to do during the study?

Children will not have to do anything that they would not normally do.

I will join some of your child's lessons during the second half of the autumn term, starting on the 4th of November and ending on the 20th of December 2019. The teacher will introduce me and explain the reason for my presence, and we will make sure that any concern your child might have is appropriately attended.

The lessons will be planned and run as usual by the teacher. Each lesson will be audiotaped, and the teacher will be videotaped. Most of the times, I will watch the lessons and take notes of the teaching practices. Other times I will assist [name of the teacher], if she/he considers it necessary and convenient in supporting students' learning.

Videotaping has the purpose of assisting me in the analysis of the teaching practices, but by no means will the videos or images be made public.

What is important to know?

- All data will be treated in accordance with the Data Protection Act 2018.
- Data will be anonymised. Any information that might allow personal identification will not be made public. And any sensitive data will be treated with confidentiality.
- Data will be securely stored for no less than 5 years or at least 2 years post-publication and then destroyed. Further information about how data is managed is available from https://www.cardiff.ac.uk/public-information/policies-and-procedures/data-protection.
- Taking part in this research is entirely voluntary. You have the right not to have any data from your child collected.
- If that is the case, that decision will not have any implications for your child's education. He, she or they will be able to attend the class as usual, but I will ignore the interactions your child might have with the teacher from my observations.

What do you do now?

If for any reason you do not want your child to be included in the research, please return the **Opt-out Form** stating this. I shall not collect any data of his, her or their active involvement in the classroom activities if that is your wish. The form should be returned to [name of the teacher] **before Friday, 18th of October 2019**.

If you have any questions about the research, please contact me (JimenezP1@cardiff.ac.uk).

Thank you for taking the time to read this information sheet.

Kind Regards,

Patricia Jimenez

PhD Researcher
Cardiff University
School of Social Sciences
King Edward VII Avenue
Cardiff

Appendix 4: Consent Forms

TEACHERS INFORMED CONSENT FORM

SREC/3378

'A Digital Competence Framework in the making: Perceptions, cultures and practices'
PhD researcher: Patricia Jimenez (JimenezP1@cardiff.ac.uk)

Purpose of Study: To advance the understandings of the way in which we, as a society, are working out what digital technologies mean, how to develop its uses, and what knowledge and skills we need to educate our children in. In particular, the study aims to produce a sociological description of the way in which digital competences are being formulated and taught in practice.

	Name Initials
1. I confirm that I have read and understand the information sheet for the above study.	
2. I have had the opportunity to consider the information, ask questions and have had these answered to my satisfaction.	
3. I understand that my participation is voluntary and that I am free to withdraw at any time.	
4. I agree to take part in the study.	

_____ _____

Name of Participant Job Position

_____ _____

Date Signature

Patricia Jimenez
PhD Researcher
JimenezP1@cardiff.ac.uk

‘A Digital Competence Framework in the making: Perceptions, cultures and practices’

PARENTS AND GUARDIANS OPT-OUT FORM

SREC/3378

If you **DO NOT** want your child to participate in the above-named research study please fill out the form below and return it to the school by **Friday, 18th of October 2019**.

If we do not receive an opt-out form from you by this date, it is assumed you are happy for a Cardiff University researcher to attend to your child’s classroom to observer how he/she/they are being taught digital competences, as described in the accompanying information sheet.

I, the undersigned, hereby DO NOT give permission for my child to take part in the study titled A DIGITAL COMPETENCE FRAMEWORK IN THE MAKING: PERCEPTIONS, CULTURES AND PRACTICES.

Name of child: _____

Name of parent/guardian: _____

Signature: _____ Date: _____

Name of researcher: _____