

Institute of Education



Towards a Model of ICT Reflexive Practice: Investigating Teachers' User-Generated Contexts and Agency in a K-12 Chilean School

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Thesis Submitted for the Doctor in Education (EdD) Degree

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April, 2022

I, Angela Novoa Echaurren confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Acknowledgements

This thesis is about six schoolteachers' reflexive capacity to integrate ICT into their practices. The notion of reflexion¹ entails two primary concepts that are indispensable for my research process: dialogue and agency. Through my doctoral journey, I encountered diverse dialogic activities that fostered reflexion and increased my agency as a researcher, recognising that research is a social action like education.

Considering this experience, I acknowledge the people who have supported me throughout these years of personal, academic, and professional growth. Firstly, I appreciate the support provided by my supervisors, Myrrh Domingo and Norbert Pachler. Essentially, I am deeply grateful for the dedication, time, detailed and careful input offered by Myrrh Domingo. Her connections with other department colleagues allowed me to engage in different academic activities that enhanced my research process, reflexive capacity, and motivation to keep going despite the difficulties any doctoral student experiences once in a while during the journey. I appreciate her patience and tenacity to help me continue with the research despite the contextual difficulties given by the pandemic crisis and the

¹ Most of the literature uses the term 'reflection' to discuss and investigate teachers' recounts about their practices (Benade, 2015; Briscoe, 2017; Brookfield, 1998; Copeland, et al. 1993; Day, 1999; Dewey, 1910; Loughran, 2002; Reinhold, 1999; Schön, 1983). Reflection tends to be used as a model to think about specific teaching experiences (e.g., a lesson, a unit of study) without connecting such a process with broader contexts. In my own work, I specifically draw from another related terminology: 'reflexive practice'. The choice is due to two main reasons. Firstly, the 'reflexive practice' concept situates teaching within broader contexts to include institutional or national policies (Bleakley, 1999; Freire & Shor, 2014). Second, reflexive practice is more apt for my context of research because my native language (Spanish) is strongly affiliated with the use of the term 'reflexion' (i.e., 'reflexión' or 'práctica reflexiva') and it is more commonly referred to as such in teacher-training courses (Novoa, 2019).

distance. I also thank Caroline Daly, John Potter for their input in the thesis proposal and John's reappearance at the end of this journey. Thanks to John Gray for his exceptional support as well.

Many people have influenced this research. Two communities deserve to be mentioned. First, the EdD course leaders, tutors, and colleagues with whom I shared all the learning experiences and emotional support. I am particularly grateful for Eden Bolívar, Liz King, Mary Chen, Thomas Chua, Nasy Pfanner and Moor Eric. Second, colleagues from my department, with whom we generated a reflexive research community concerning teachers' pedagogical uses of ICT, nurturing each other's investigations, and producing new research paths. I am incredibly grateful for Alejandra Canales Tapia and Linda Molin-Karakoc collaborative research and friendship.

Thirdly, I thank the people I write about in this thesis. I have learnt about ICT and professional learning and how reflexion is key to any domain of the education system. I have learnt that dialogue is pivotal to decision-making to make the most of ICT adjusting the practice to the particular conditions of the learners' contexts. I have learnt that ICT policies -like any other educational policy- must account for the baseline, and the baseline must consider the top to design and implement authentic ICT practices. I have learnt that professionals must keep learning throughout their entire professional career, and policymakers must ensure its provision for teachers.

Last, I thank the people who helped me review the thesis. I thank Ruth Cave for her exceptional inputs. And most of all, my friends and family, especially my father, sister, cousin, and husband, who provided emotional and intellectual support by proofreading my work many times. Thanks to my workplace for believing in me. Despite all the difficulties experienced in the journey, you never doubted I would make it.

Reflective Statement

a. What did I learn throughout the EdD?

Throughout my doctoral journey, I have increased consciousness and expertise in four primary areas: social science research, teacher professionalism, educational technology and pedagogical innovation.

Regarding social science research, my supervisors and course leaders helped me to delve deeper into quantitative data analysis, more specifically, to learn about scale development, reliability, and construct validity. Such a learning process allowed me to ensure methodological rigour for the first significant product of the EdD: the institutional focused study (IFS). The essays I developed for the MOE1 and MOE2 courses (Novoa, 2016a and 2016b) specifically enabled me to pursue the abovementioned purpose and prepare the methodological terrain to design the IFS.

I conducted a mixed-method approach in the IFS (Novoa, 2018). I contributed to the knowledge of educational technology and continuous professional development (CPD) by identifying two specific kinds of digital literacies within a sample of 71 schoolteachers (i.e., critical digital literacy and operational digital literacy²). Class observations and semi-structured interviews accompanied a survey application to carry out a more profound understanding of teachers' capabilities and needs regarding their ICT skills both in technical (i.e., how to

² The former refers to the teacher's critical thinking skills regarding which, why and how to use ICT in teaching. The latter is associated with the professional's competencies to manipulate ICT effectively and efficiently, that is, how easy or difficult is it for him or her to operate a wide range of technologies. It is important to note that a person's digital literacies do not function isolated. They interrelate. For the scope and purposes of the IFS, I only selected two of them. For more information, please review my IFS or an article related to a conference in which I presented with another colleague of the Culture Communication and Media Department of UCL IOE (Novoa-Echaurren & Canales-Tapia, 2018).

manipulate them) and pedagogical terms (i.e., understanding critically 'how' they should use ICT with pupils to maximise learning potentials). After the IFS, I was commissioned by a Chilean network to replicate the quantitative section of the study. It allowed the network's leaders and policymakers to identify teachers with professional needs regarding their critical and operational digital literacies and recognise educators that could help others increase their literacies. The network used this information to generate a CPD model suitable to their contextual specificities. This situation shows how the outcomes of my research have been replicated in other settings.

The initial exploration based on a mixed-method tradition led me to conclude that 'literacies' were not enough to understand how teachers foresee, use, and assess the outcomes of a given ICT practice with pupils. In the search for a more suitable concept, I found 'reflexive practice' or 'reflexion'. A deductive approach allowed me to develop a deep exploration of the notion's development and application to teachers' CPD. After such an investigation, I encountered three significant gaps: first, the concept has been rarely applied to teachers' ICT practices; secondly, the notion has been rarely encouraged as consistent and high-quality professional development that allows teachers and students to make sense of ICT learning and teaching experiences; thirdly, the concept has usually been conceived in a narrow sense, that is, reflection as a mere personal cognitive process about a single learning and teaching situation rather than a practice that includes the entire ecosystem in which it is embedded. This third gap is critical because it denotes a distance between policy, theory, and practice. At that point, I was in the position of defending my thesis proposal (Novoa, 2019) through the upgrade or EdD formal review.

As I investigate and discuss in my thesis, teacher reflection must move from a personal to a holistic approach, in which the professional considers the broader features of the teaching context that influence the practice, such as the student's

background, the collaboration with colleagues, the institution's norms and regulations, and the national policies, among others. As I propose in my thesis, the notion changes from reflection (narrow) to reflexion (holistic). In other words, I propose to renovate the term 'reflection' for 'reflexion' to represent a more encompassing notion, which includes professional, departmental, and institutional dimensions to keep refining teachers' ICT practices over time. I present a framework that will help me demonstrate how teachers can expand 'reflexion' to consider broader layers of the school ecosystem that move beyond one particular classroom experience. My research journey has moved from analysing specific isolated concepts to developing a complex network of related notions around the term 'reflexion'.

Methodologically speaking, I moved from a positivistic to a qualitative tradition. Although I developed a mixed-method approach, the IFS highly drew on the quantitative stance. The qualitative section was relegated to a descriptive account of the data, requiring a more profound conceptual development. However, it must be recognised that the scope and period required to carry out the study (i.e., one year) did not allow me to develop a more significant expansion.

The thesis led me to a conceptual change (i.e., from digital literacies to ICT reflexive practices). The shift was not as drastic as I thought it would be. As I developed the thesis, I realised that the complexity of the 'reflexion' concept was closely related to digital literacies. Both concepts need each other. For instance, when teachers develop their critical digital literacy (i.e., their critical thinking about what, how and for what purposes using ICT with their students increases learning gains), they reflect on their ICT teaching practices. Nevertheless, that is only a part of their reflexive thinking about their ICT teaching practice. As I will discuss in this thesis, the concept of reflexion goes much further.

Moving from the IFS to the thesis helped me mature in conceptual and analytical depth. The case study design combined with the theory of reflexive practice and user-generated contexts enabled me to scrutinise a specific phenomenon acutely to produce a flexible ICT reflexive practice (IRP) framework. Furthermore, as I did with the IFS, I aim to replicate the framework to other learning and teaching contexts.

“Life happens”. Our previous programme leader, Professor Denise Hawkes, shared this phrase with doctoral candidates several times. The expression incarnated the idea that a doctoral journey also has its struggles. Going through the EdD was not exempt from difficulties. To gain the analytical depth suitable for a doctoral level, I passed through diverse crises that affected my performance in different moments (e.g., the pandemic, the Chilean socio-politic and economic crises, among others). Besides, being a part-time student was also problematic. Balancing the demands of the EdD with my professional and personal life was sometimes challenging. Despite these difficulties, I would make the journey all over again. The learning I gained exceeded the difficulties. New knowledge allowed me to grow in the fields of educational technology, teacher CPD, and social science research.

The outcomes of such a process have been progressively visible throughout my doctoral journey. I have been involved in different academic communities inside and outside UCL. For instance, I have been working with two department colleagues on a joint systematic review project regarding ICT teaching practices in Finland and Chile. I have also presented at conferences and seminars at different European venues (Novoa-Echaurren & Canales-Tapia, 2018; Novoa-Echaurren, 2020). I have presented the preliminary findings of the IFS at UCL IOE's Summer Conference (Novoa, 2017). I have participated in a bi-national (i.e., Chile and Argentina) research regarding multiplayer online videogames and published an article in a specialised academic journal (Albarelo, et al., 2021). I

am currently collaborating in a research team sponsored by different international organisations about a Chilean new pre-school policy. Ultimately, I co-founded an Innovation Committee inside an Undergraduate Department of a Chilean University to support professionals and academics in sustaining high-quality, innovative pedagogies that include remote and hybrid teaching to respond to the Covid-19 pandemic. I have shared my knowledge about social science research, educational technology, pedagogical innovation, and continuous professional development to all these projects. I have contributed to knowledge construction beyond the thesis, extending bridges that connect the notion of reflexive practice with other related areas to ICT and education. Likewise, I have learnt from these communities and brought new knowledge to my own research in the EdD. In this sense, as with any learning process, it has been multidirectional and multidimensional.

b. Why choosing an EdD?

One of the most profound challenges in education is shortening the gap between theory and practice. The focus of the Doctor in Education (EdD) at UCL IOE aims precisely to accomplish such an aim. The fact that the programme is part-time was both a challenge and a benefit. It allowed me to combine research and educational practice to be conscious of each area's particularities and how each one can contribute to the other. In this way, I applied new insights into my professional practice while researching. In addition, my professional practice informed me of new ways to approach research. Therefore, constantly moving from theory to practice, and conversely, was necessary to accomplish my goals throughout the programme. In other words, the EdD programme pursues a balanced contribution to knowledge in three domains: theoretical, methodological rigour, and practical educative domain. Although I had a sense of this situation when applying to the programme, I became more conscious about it every day.

The theory I developed in my thesis is the culminating point that allowed me to confirm this idea confidently.

c. What comes further?

As I mention in the final section of my thesis, I plan to continue contributing to knowledge construction in the field of educational technology, pedagogical innovation, continuous professional development, and social science research. More specifically, the thesis' primary contribution to knowledge (i.e., the ICT reflexive practice framework, IRPF) can be applied to different contexts, such as student teachers, teacher educators, schoolteachers working in different institutions, academics who teach in Higher Education professional careers not related to education, among other areas. Additionally, the theoretical and research skills I have learnt throughout my journey in the EdD will allow me to pursue and expand research paths, moving beyond reflexive practice to other areas that may appear according to the needs that arise from current societal, cultural, temporal, political conditions. For instance, my involvement in researching the impact of the current educational reform in the Chilean preschool system or my collaboration in the research regarding multiplayer online video games responds to such a consideration. It will be a matter of being open, flexible, and creative enough to keep contributing to knowledge in the field, just as any reflexive educator and researcher should be.

Abstract

In this study, I investigate six teacher participants' engagement in a reflexive practice programme as part of their continuous professional development (CPD) in a K-12 institution. I specifically focus my study of Reflexive Practice (Dewey, 1910; Dewey, 1922; Freire, 2005; Freire, 2011; Freire, 2014) on the participants' Information Communication Technology (ICT) practices within their subject domain. Exploration of ICT reflexive practices within a CPD programme is an underdeveloped area of research. Data include observations and interviews gathered from teacher participants and their respective Heads of Department. Data demonstrates the significance of teachers' agency and dialogue to enhance ICT practices and collaborations in three dimensions: professional, departmental and institutional. Key findings inform the development of an ICT Reflexive Practice (IRP) Framework that I outline as part of my research contribution. Drawing from the notion of User-Generated Contexts (UGCs; Dourish, 2004, Dourish, 2017; Luckin, 2010; Luckin et al., 2011, Luckin, 2018), the IRP Framework adds 'reflexion about ICT' to the schools' existing RPM. It assesses the underpinnings supporting teachers' ICT practices (e.g., pedagogical theories, curricular basis, policies, among others). This issue has arguably become a recurrent concern for different traditions involved in educational technology under the argument that teachers' real innovative and transformational ICT uses in teaching remain underdeveloped (Albion & Tondeur, 2018; Crook et al., 2010; Hinojosa et al., 2016). The IRP Framework combines RP and ICT holistically by moving beyond a single classroom experience to consider the entire school ecosystem. Especially in the COVID-19 pandemic context, where ICT has increased its role in education, policymakers must provide teachers with adequate CPD reflexive opportunities suitable to their specific needs. The IRP Framework, which emerged from a systematic comparison of the data against the theory of RP and the concept of UGCs, offers the CPD model teachers need to assess their ICT practices and keep refining them over time.

Impact Statement

In my thesis, I have investigated how six schoolteachers' information and communication technology (ICT) reflexive practices (IRP) generated unique contexts suitable to their pupils' learning needs and conditions. This exploration may benefit educational policy, research, and teachers' ICT professional practices. The research methods and analysis help reduce gaps between ICT policies generated outside teachers' direct instruction with their students. The research design can also bridge ICT theory and practice gaps reported by the literature regarding teachers' ICT practices. These two benefits may help increase the quality of continuous professional development (CPD) provision regarding this specific matter because it integrates the educator's vision, thinking, beliefs and conditions with that of theorists and policymakers, generating a 'holistic reflexivity' (Benade, 2015; Bleakly, 1999). This notion has been widely used in educational research but barely applied to ICT practices. Recent scholars report the need to foster holistic reflexivity about teachers' ICT practices by considering the professional aspects of teaching with ICT, and broader dimensions, such as working with colleagues and institutional policies.

This thesis contributes primarily to three areas: a) teacher professionalism, b) CPD, and c) educational technology research. Concerning teacher professionalism, the thesis provides an ICT reflexive practice (IRP) framework that helps teachers consider their direct relationship with pupils and other features of the larger ecosystem (i.e., the school) that may shape the practice. Even more, the IRP framework serves as an instrument to assess and project how to design (or redesign) ICT practices suitable to their learners and contexts. In so doing, teachers consider pedagogical features that allow them to make the most of ICT to ensure learning among their students. In this sense, by using the IRP framework regularly, teachers participate in iterative reflexive cycles of projecting, anticipating, designing, implementing, assessing, and refining,

projecting and so forth. An essential framework principle is to collaborate with colleagues and integrate personal, departmental, and institutional dimensions in every stage of the teachers' decision-making process. Regarding institutional policy, the framework guides school Headteachers and other leaders on carrying out and sustaining CPD about teachers' ICT practices. This issue has been particularly significant in recent research (Michos et al., 2018; Philipsen et al., 2019). The framework focuses on improving teachers' ICT reflexive practices and articulating the educator's professional dimension with broader domains involved in the practice.

Since the early 2000s, educational technology has been increasingly significant for national and institutional policymakers and researchers. The Covid-19 outbreak has arguably shown the potential of ICT to bring together teachers and learners in times of crisis. It also has challenged teacher professionalism, such as migrating from in-person to online teaching and assessment methods. This thesis will show how reflexive practice is pivotal to allow teachers to enhance their decision-making process concerning teachers' ICT practices collaboratively and, as a result, increase agency.

I foresee that the impact of my thesis will occur primarily in methodological terms. The integration of the RPM with the IRP framework can serve a variety of contexts contributing to teachers' CPD, educational technology research and the generation of policies concerning ICT teaching practices. While the RPM stresses the importance of dialogue and agency to keep refining teachers' practices over time, the IRP framework brings to light ICT. It brings together reflexion with ICT, a gap that has been arguably reported by several scholars from different traditions in the educational technology field (Lim et al., 2013; Michos et al., 2018; Philipsen et al., 2019; Pynoo, 2011; Schere et al., 2020; Stockless, 2018; Tallvid, 2016).

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Glossary

1. *Agency*. The concept is applied to the teachers' capacity and opportunities to make autonomous decision-making regarding their ICT practices (Albion & Tondeur, 2018; Jones & Charteris, 2017). It implies considering the personal and the institutional aspects associated with the use. In this sense, agency is related to freedom and responsibility, therefore, to collaborative decision-making (Novoa-Echaurren, 2020).
2. *User-generated Context*. In reference to this thesis, a context can be understood as a complex set of interactions generated by teachers and learners while using ICT. Contexts take place in a given space, place, time (Dourish, 2004; Dourish, 2009; Luckin, 2010; Luckin, 2018). They combine physical and virtual environments making the interactions across them complex and producing an impact on learning (Dourish, 2017). Contexts are generated by ICT users: they are shaped by the interactions and decisions they make within the context. Simultaneously, contexts shape the ways in which users understand and represent the world (Dourish, 2004, Luckin, 2018). Contexts intertwine with other contexts embedded into the school ecosystem, shaping the ways in which the school operates in their daily life and, conversely, contexts are constantly shaped by the frames of the institutional norms and regulations. In this thesis, a context is generated by a teacher and his or her students within the boundaries of his or her school ecosystem. These particular contexts interact, generating broader contexts, comprising the institutional ecosystem. Various school ecosystems situated in the same region (e.g., Santiago, Chile, Latin America) include a broader context, which I label as the macrosystem.
3. Continuous professional development (frequently abbreviated as CPD). Regarding teachers' ICT practices, the term can be defined as a continual process of specialised learning about ICT that carries out throughout the entire professional life (Ertmer & Ottenbreit-Lefwitch, 2010; Jones &

Younie, 2014; Michos et al., 2018; Philipsen et al., 2019; Porayska-Pompsta et al., 2018). The teacher does not only exert the role of and educator. As an educator he/she must permanently assess the ICT practice and learn from it.

4. *ICT*. This term corresponds to the acronym for 'information and communication technologies'. I preferred to use this concept over other related terminologies (i.e., digital technologies, emergent technologies, educational technologies), because this concept is more specific to information and interactions among users (Livingstone, 2012). Therefore, the notion deals with how people use/construct information and share them to achieve potential learning gains (Dourish, 2004, Dourish, 2009; Dourish, 2017; Luckin, 2010; Luckin et al., 2011; Luckin, 2018).
5. *ICT teaching practice or ICT reflexive practice*. The concept refers to every action associated with teaching with ICT, from developing the teaching design to assessing the outcomes of the learning experience (Bleakly, 1999; Dewey, 1910; Dewey, 1922; Freire, 2005; Freire, 2011; Freire, 2014; Michos et al., 2018).
6. *Reflexion*. Process of assessing a given practice by considering personal, collaborative and institutional aspects associated with the teaching practice. In this way, the professional integrates his/her practices into the ecosystem in which it is embedded and makes decisions suitable for all the agents involved in the practice. Please note that my use of this spelling throughout is purposeful and to inflect it with meaning beyond 'reflection' (Bleakly, 1999; Dewey, 1910; Dewey, 1922; Freire, 1998; Freire, 2005; Freire, 2011; Freire, 2014).
7. *School ecosystem*. Set of relationships, roles, places, locations, spaces, staff, learners, infrastructure, resources, norms, and regulations available within a school community to make the institution work. All the features that define the institution's way of operating and being as a system

(Bleakly, 1999; Dewey, 1910; Dewey, 1922; Freire, 1998; Freire, 2005; Freire, 2011; Freire, 2014).

Acronyms

1. C1-C6: Cases 1-6.
2. CPD: Continuous professional development.
3. EoR: Ecology of resources.
4. ICT: Information and communication technologies.
5. HoD: Head of department.
6. IRP: ICT reflexive practice.
7. PBL: Project-based learning.
8. PD: Professional development.
9. RP: Reflexive practice.
10. RPM: Reflexive practice model.
11. SAMR: Substitution, augmentation, modification, and redefinition.
12. TA: in the analysis chapter, it deals with thematic analysis. In the rest of the thesis, it refers to teacher agency.
13. TFU: Teaching for understanding.
14. TPACK: Technological, pedagogical, and content knowledge.
15. TPD: Teacher professional development.
16. UGCs: User-generated contexts.
17. ZAA: Zone of available assistance; ZPA: Zone of proximal adjustment; ZPD: Zone of proximal development; ZOC: Zone of collaboration.
18. TIP: Technology, innovation & projects.

Scope of the Thesis

This thesis explores how a reflexive practice model (RPM) as continuous professional development (CPD) is being used inside a Chilean school to facilitate teachers' understanding of their information and communication technologies (ICT) practices. Although the 'reflexive practice' (RP) concept has been used widely in educational research, understanding its potentials for ICT pedagogies and praxis remains underdeveloped.

My thesis explores a group of teachers' reflexion about their ICT practices in a Chilean school. The conceptual development of 'reflexion' or 'reflexive practice', although not new, is more apt for my research than 'reflection'. Reflexion includes considering the wider school ecosystem to understand different factors that impact on teachers' ICT practices in schools. Therefore, from this point onwards, I will use the term 'reflexion' and 'reflexive practice' interchangeably to discuss teachers' thinking about their ICT practices.

This concept responds to the fact that multiple scholars have analysed the term 'reflection' but have not problematised the notion in reference to ICT teaching as practices embedded into a wider ecosystem (Benade, 2015; Bleakly, 1999; Bolton, 2010; Briscoe, 2017; Brookfield, 1998; Cole, 1997; Copeland et al., 1993; Fox et al., 2011; Glenn, 2011; Loughran, 2002; Mitchell, 2017). Following this viewpoint, I draw on Lim et al.'s (2013) definition of school ecosystem as multiple elements and diverse relations that may enhance or constraint its growth. It contains subsystems which consist of the interplay between groups (e.g., teachers, learners, school authorities, parents, and other staff members) and processes that are also linked to the broader macrosystem in which the ecosystem is embedded (e.g., national policies, academy, and even the society at large). In this way, insights about the teachers' ICT practices are not simply gathered from a personal viewpoint (e.g., his/her classroom or the

implementation of a specific lesson plan) but will also factor diverse complexities that shape their ICT practices to include the wider departmental and institutional contexts. These complexities are recognised from Dewey's (1910) understanding of reflexion as a way of democratic and ethical teaching, as well as Freire's (1998) development of reflexion as liberatory practice.

Structure of the Thesis

The thesis is organised into four parts. First, in chapters one, two, and three I discuss the introduction, the literature I surveyed for this research and the theoretical framework associated with the problem to be explored. Part Two deals with the Research Design and Methodology. Part Three discusses Data Analysis and Findings. Part Four presents the discussion and conclusions.

Part 1. Investigating Teachers' Reflexive and ICT Practices

Chapter 1. Introduction

In this chapter, I discuss the purposes and rationale of the research, the context of the study, and the research questions.

I have had three prominent roles throughout my professional career to date:

- secondary schoolteacher;
- teacher consultant on ICT and pedagogical innovation; and
- lecturer and researcher in Higher Education contexts.

Through each of these roles, I became interested in the myriad of ways schoolteachers used ICT in their teaching. I was initially drawn to *how* teachers adapted their uses depending on their subject domain and grade levels (e.g., 2nd or 8th grade). However, the more I worked with teachers and observed their ICT practices, I noticed that there were other features shaping their different approaches to ICT integration. I began to understand that ICT teaching practices in schools are relevant for different areas of the education system (e.g., policy, educational research, among others). ICT practices are complex because they require a consideration of the ecosystem in which teachers work. For instance, it is often expected that teachers' ICT practices align with the school policy and policymakers' viewpoint³, which provide an institutional framework. However, through my work and research, I started to notice that teachers who carefully consider other aspects of the wider school ecosystem such as personal, professional, and departmental dimensions, most often have the potential of shaping their ICT practices to augment learning impact and implications.

³ I refer to school policymakers as different school authorities and leaders, such as the headmaster or headteacher, deputy headteacher, and heads of departments (HoD).

Considering all these ideas, I sought to investigate reflexive ICT practices that focuses on teacher learning opportunities to develop mindful continuous professional development (CPD) for practitioners and administrators. CPD provision regarding their ICT practices has become a recurrent claim among recent scholars and specialists in the field of educational technology (Auerbach et al., 2019; Cukurova & Luckin, 2018; Davies, 2018; Lørke Weitze, 2018; Luckin & Cukurova, 2019; Michos et al., 2018; Philipson et al., 2019; Porayska-Pomsta et al., 2018).

Moreover, this issue has become more evident with the Covid-19 outbreak and the drastic change from in-person to remote and hybrid learning. ICT is now the centre of attention because it has been used as an emergency medium to cope with the current sanitary, educational, social, economic, and political crisis (Williamson et al., 2020). The field of educational technology has been a relevant matter for decades (Selwyn et al., 2020). Yet, the implications of embedding technology in teaching more strongly need to be carefully balanced, as Freire (2005) suggested years ago. Most of the time, teachers undertake this complex process without the necessary reflexive opportunities to carry out such transformations consciously. For instance, Carrillo & Flores (2020) argue that teachers, teacher educators and researchers need to move from an 'emergency teaching' stance to more consistent thinking about how ICT, especially online teaching, can enhance learning in times of Covid-19. In their study, González et al. (2020) sustain that teachers "reported spending long hours working on adapting their activities to an online format, providing printed resources for families without access to the Internet and offering feedback to parents and students" (p. 267). The authors also highlighted that this process was spontaneous and claimed that institutional and national policymakers must provide more support. Although focusing on higher education, Schildkamp et al. (2020) suggest that educators need to be provided with sufficient and high-quality CPD to think thoroughly about transitioning from in-person to online and blended

teaching trends emerging from the pandemic. I argue that schools faced a similar problem even before the Covid outbreak.

It has been my main research interest to explore CPD approaches that can facilitate teachers' conscious ICT practices. As I will show in my empirical study, the term 'reflexion' or 'reflexive practice' is generative for exploring, analysing and expanding on the teacher participants' purposeful appropriation of ICT in praxis and, in some instances, to capture their on-going reflection and effort to collectively improve their ICT practices. I use 'reflexion' and 'reflexive practice' interchangeably and it is the primary concept of my study. Teacher training literature often use the term 'reflection' or 'reflective practice'. I am not referring to the same usage in my own research. Reflection is commonly linked to the teacher's recounts about his/her teaching and learning experiences based on fixed or static connotations (Bolton, 2010; Farrel, 2011; Fox et al., 2011; Gore & Zeichner, 1991; Loughran, 2002; Mezirow, 1997; Schön, 1983). In other words, 'reflective practice' has been associated with the teacher's thinking about prior teaching experiences (e.g., one classroom session) without considering the dynamic interplay between different features that may shape the practice (e.g., each student's learning needs, the class climate, the school authorities' viewpoint regarding how teachers should teach with ICT, among many other features).

Therefore, in this thesis, I aim to contribute and further develop the concept of 'reflexion' or 'reflexive practice' in relation to teachers' ICT practices as CPD, an on-going and ecosystemic process that extends beyond one class or one lesson. Drawing on key findings, I will also develop an ICT reflexive practice (IRP) framework that aid teachers, researchers and policymakers to understand, make sense of and refine ICT practices over time. More specifically, findings from my thesis will illustrate how the teacher participants developed their ICT practices by consciously and purposely attending to three reflexive dimensions, that is the *professional*, the *departmental* and the *institutional*. These three dimensions are

essential to an ecosystemic approach and to move beyond a reflective practice model which tends to isolate lessons and classes from the wider sociocultural context.

Summarising what I have said so far, 'reflexion' does not only entail a teacher's reflective professional dimension (e.g., thinking on the outcomes of a given ICT usage in a classroom lesson). Rather, the concept of reflexion I will discuss is more encompassing in its inclusion of professional, departmental, and institutional dimensions as part of shaping on-going ICT practices. Some examples of this idea are the interplay between specific classroom experiences, the collaborative work with colleagues and policymakers. Within this framework, I will demonstrate how the teacher can expand 'reflexion' to factor broader instances of the educational system, such as the national policies and the school community's cultural background. This aspect of the framework aims to bridge a widely reported gap between policy and practice. In other words, the intentions and expectations among policymakers regarding 'why', 'which', and 'how' teachers should conduct their ICT practices with pupils do not always coincide with their practical conditions (Albion & Tondeur, 2018; Claro & Jara, 2020; Lowyck, 2013; OECD, 2009; Vanderblinde et al., 2012). Through his notion of liberatory practice, Freire (1998) sustains that teachers who critically integrate policy, economy, society, culture, and theory into their practices will be able to carry out authentic learning and teaching experiences with pupils. This idea presupposes the notion of holistic reflexivity. In his view, the teacher must consider a wide range of dimensions that might shape their profession towards safeguarding their students' learning.

On the other hand, based on two traditions of the theory of 'user-generated contexts' (Dourish, 2004, 2009, 2016 & 2017; Luckin, 2010 & 2018), I will demonstrate how teachers and institutions that draw their reflexive practices in

the abovementioned approach, generate complex and unique contexts that make the most of ICT according to the specificities of their ecosystemic conditions.

1.Context of Research

Based on qualitative case study research (Bogdan & Biklen, 2006; Perryman, 2011; Yin, 2018), I examined a reflexive model practice as a continuous professional development (CPD) programme within a Chilean k-12 school. The model requires teachers to participate in one-hour weekly reflexive practice meetings specific to the teacher's subject domain. The meetings are held with colleagues from the same Department and the Head of the Department (HoD). I explore this particular schools' Reflexive Practice Model (RPM) as part of an institutional CPD policy and how the teachers of this study drew on 'reflexive practices' to understand and refine their ICT uses. The focus on the RPM as CPD enabled me to delve deeper into the ways in which the teacher gets involved in the process of decision-making concerning the ICT practice.

This particular policy also requires teachers to implement two pedagogical approaches standing in-between socio-constructivist and constructionist theories: the teaching for understanding (TfU) and a project-based learning (PBL) framework (Chanpet et al., 2018; Perkins, 1993; Svihla et al., 2015). The reflexive practice model as CPD has evolved and been reframed continuously as part of the implementation process. My research illustrates a more specific understanding of 'reflexion' concerning ICT teaching practices within the overall school policy.

Within the context specified, the purposes of the thesis are to:

- Examine the interrelationship between teachers' reflexive and ICT practices.

- Develop an *ICT reflexive practice (IRP) framework* that both draws on and expands beyond reflection and reflective practice models identified in seminal literature.
- Investigate ways in which the IRP framework developed could facilitate professional, departmental, and institutional CPD.

2. Research questions

1. In what ways are the teacher participants' ICT practices developed through and developing beyond the Reflexive Practice Model (RPM)?
 - a. What RPM features are developed to facilitate ICT practices?
 - b. How are these features operationalised through the institution's CPD policy?
 - c. What additional features have the teacher participants been developing beyond the RPM?
2. Beyond the CPD model promoted, what other ecosystemic dimensions do the teacher participants consider as part of his/her ICT reflexive practices?
3. How do the personal, departmental, and institutional dimensions interplay within an ICT reflexive practice model?

Chapter 2. Literature review

1. The notion of 'reflexive practice' in the context of ICT

Immense research has been conducted in the field of educational technology that has also established the theoretical standpoints for my research. From this broad variety offered, I draw specifically on teachers' ICT practices because they are situated at the frontline of the problem I have identified in the introduction. Although the reader will find references across different research traditions on ICT, educational technology, technology mediated learning, pedagogy, among others, I needed to review these different perspectives to understand the issue present in teachers' ICT practices. The teaching practice is complex. The understanding of it comes from diverse meanings and standpoints. Analysing these diverse traditions has allowed me to acknowledge that the issues associated with reflexive practice I have described in the introduction persist across different teaching contexts and research evidence. In other words, investigating teachers' ICT reflexive practices is vital because it involves and affects such traditions and research trends.

Throughout the widely cited literature on educational technology, I have identified three relevant issues that specify teachers' decisions regarding their ICT practices in schools. Firstly, the research in the field of educational technology has reported that, although ICT practices in schools have increased over time, real transformational and creative uses that foster authentic learning⁴ among

⁴ Drawing on socio-constructivist and constructionist traditions, I understand learning as active and collaborative -at the same time, independent- intricate processes where knowledge construction and skill development take a fundamental place (Fullan & Langworthy, 2014; Laurillard, 2007; Laurillard, 2012; Stone Wiske et al., 2013; Vygotsky, 1978). Following these viewpoints, both terms 'authentic' and 'meaningful' imply social knowledge building, mastery of the subject area, and applying knowledge in real-life situations (Anders, 2018; Laurillard, 2012; Peng et al., 2019).

pupils remain underdeveloped (Crook, 2012; Ertmer & Ottenbreit-Leftwich 2010; Ertmer & Ottenbreit Leftwich, 2013; Lim et al., 2013; Ricoy & Sánchez-Martínez, 2019; Selwyn, et al., 2020; Tallvid, 2016). Secondly, the extensive research on ICT uses in schools reports the need to provide professional learning opportunities that help teachers integrate and increase their technical, pedagogical, and subject-specific knowledge of their ICT practices (Hanney & Skirkeviciutey, 2019; Hernández-Sellés et al., 2019; Koehler & Mishra, 2009; Koehler, Mishra & Cain, 2013; Korhonen et al., 2019, Michos et al., 2018; Pardo et al., 2019). Thirdly, recent studies on educational technology claim that such professional learning opportunities must focus on reflexion as a way to enable teachers to assess and cultivate their practices over time (Briscoe, 2017; Michos et al., 2018; Schildkamp et al., 2020).

Acknowledging these ideas, in this chapter I provide a brief overview of the Chilean educative context and the challenges that teachers face in their ICT practices. Then, I delve deeper into the issues of this specific matter brought up in the international research. I discuss reflexion and how it can be applied to teachers' ICT practices. I conclude the literature review by analysing reflexive practice as an approach of continuous professional development (CPD) that can help facilitate teachers' ICT practices whilst also promoting teacher agency.

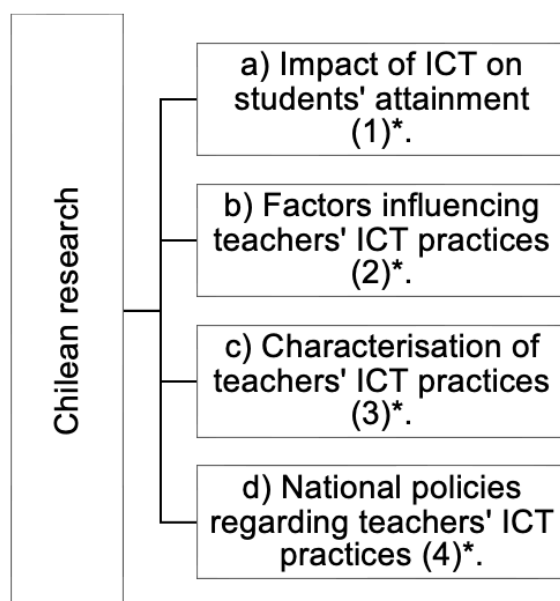
a. The Chilean educative landscape and the challenges of ICT practices

In Chile, there is a large body of research exploring teachers' ICT practices. Most studies have focused on four primary areas (see figure 1). I will emphasise the national policies regarding ICT practices to characterise their general reality and support the need to provide opportunities for CPD on this matter.

Institutional and national policies are significant factors when dealing with teachers' ICT practices. Therein, Jaramillo & Chávez (2015) show different ways of using ICT by teachers and students inside the Chilean classrooms. These

researchers argue whether the ICT integration in teaching has been a result of a planned intention of national policies promoted by the network Enlaces (Links; Hepp et al., 1996), an idea that has been suggested by other scholars as well⁵.

Figure 1. Chilean studies concerning teachers' ICT practices⁶



Source: author's own creation

Enlaces functioned under the regulations of the Ministry of Education from 1992 to 2020. This public policy provided ICT infrastructure and connectivity inside state-funded schools, implementing digital resources, and offering professional development (PD) programmes. In 2020, Enlaces was reformed into the 'Centre for Innovation in Education' (Claro & Jara, 2020).

There are different reasons for the disappearance of Enlaces. I highlight, among others, the lack of relationship between specific organisation's policy and the

⁵ See the references in figure 1 and appendix 1.

⁶ *References shown in appendix 1.

teachers' actual conditions to develop their ICT practices as expected by such policies. By 2006, 92% of state-funded schools across the country were equipped with ICT infrastructure, mostly wired Internet, and computer labs. However, consistent PD opportunities and large-scale creative ICT practices have not been reported with confidence in most Chilean studies (Claro & Jara, 2020). The above means that relevant investigations on ICT in schools reveal uses that support traditional teacher-centred practices rather than ones that foster active student participation and commitment to their student-centred learning processes (Claro et al., 2013; Fariña, et al., 2015; Hinojosa et al., 2016).

Although there has been an explicit intention to use ICT in teaching, most ICT practices have not yielded substantial changes in how these devices, services and resources can aid teachers and students beyond more traditional approaches. In this sense, Sánchez et al. (2011) claim that Enlaces' achievements during the 1990s were not sustained by 2011. These researchers indicate that one of the reasons for this has been the limited focus of recent state-funded interventions, such as offering isolated training opportunities outside the teachers' workplace, making it difficult for them to understand how to integrate their understanding of ICT with their school's ecosystem specific conditions. This idea highlights the importance of the institutional context within which teachers make decisions regarding their ICT practices. It also stresses the relevance of the continuity of the programmes associated with ICT. Education professionals must assess how their learning can be applied to the practical contexts and whether the ICT practice makes sense to them and their pupils. Thus, professional development (PD) should provide reflexive opportunities that allow teachers to get involved in such an assessment. Currently, this idea seems to be missing in Chile and the international landscape, as I explain later.

Despite the abovementioned idea, other studies reveal that, if we compare Chile with our neighbouring countries, policies demonstrate clear progress of ICT

practices in Chilean schools. For instance, Salinas et al. (2016) have conducted a comparative study between different Latin American countries. The researchers affirm that Chile has seen more systematic ICT integration into the classrooms because long-term policies have explicitly sought the integration of ICT into the curriculum. According to these researchers, the latter can be mainly explained by an alignment between high levels of technology use, more training opportunities for teachers, greater knowledge of ICT use, and a shared understanding of ICT's potential benefits in teaching and learning.

However, these results do not completely coincide with other related research. Claro & Jara (2020) expound that since the 2000s onwards, Enlaces' initiatives have been strongly diversified. This situation has made the institutional vision of teachers' ICT practices a highly problematic issue. In other words, there are difficulties in generating a clear understanding among institutional policymakers of 'why', 'which' and 'how' ICT should be used in their specific educational contexts. Also, Enlaces' initiatives have emphasised the ICT practices' technical rather than the pedagogical aspect (Rodríguez, et al., 2012). This idea brings us back to the problem I have presented earlier: policymakers and, most importantly, teachers need reflexive opportunities to learn 'why', 'which', and 'how' to use ICT to encourage their students' learning. The above implies a need to consider the teachers' specific contexts as part of the wider school ecosystem.

In this section I have identified a gap between ICT policies and practice in education. While national policies have offered ICT infrastructure and isolated learning opportunities, such a provision has focused on technical aspects of the ICT practice and taken place outside teachers' professional contexts. These issues make it difficult for teachers to understand how ICT can increase learning inside their specific teaching context. As demonstrated in the research literature of Chile as well as shown in my own research, a shift in PD provision towards reflexive CPD embedded within an institutional context proves to be essential.

Namely, the pedagogical aspects of reflexive ICT practices that should be focused on CPD. The school I investigate in this thesis offers an example of how some of the aforementioned key issues have been addressed through a reflexive practice model CPD approach. However, there are additional dimensions beyond the original CPD model that I illustrate as fundamental to an ICT reflexive practice (IRP) framework. I will further discuss this key finding in the latter part of my thesis. At this point, it is significant to demonstrate how the Chilean experience resonates and differs from ICT teaching practices reported in international investigations.

b. The primary challenges for ICT teaching practices reported in the international research

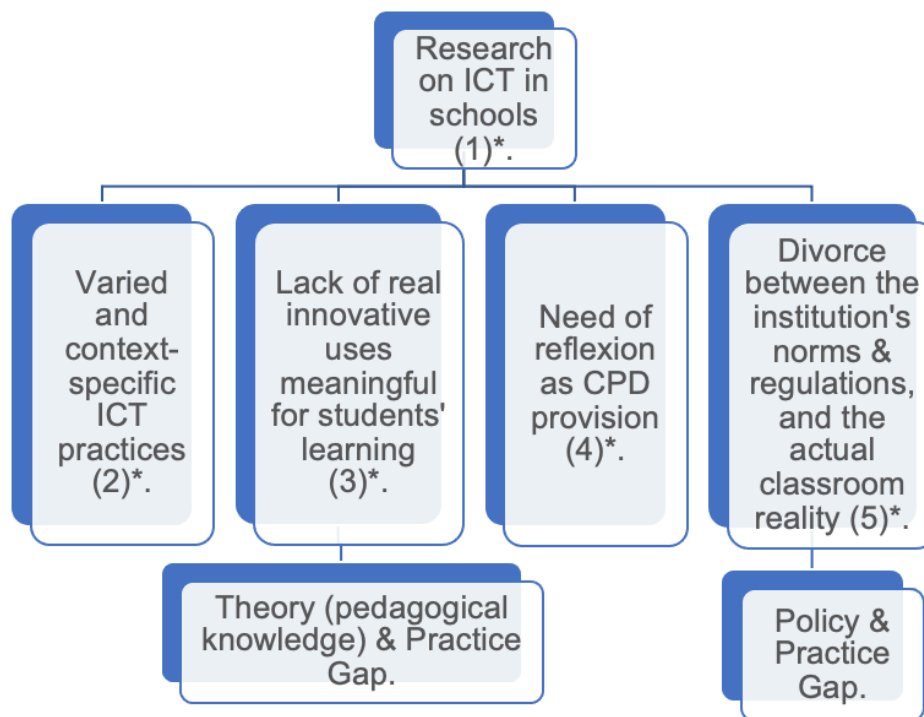
Various problems of teachers' ICT practices have been extensively discussed in numerous studies (Albion & Tondeur, 2018; Ibieta et al., 2017; Tallvid, 2016). Some critical issues resonate with what I have previously highlighted in the Chilean context (see figure 2). For instance, several investigations have reported difficulties to determine 'successful' ICT practices because they have been remarkably varied and context-specific (see box no.2 in figure 2). Therefore, teachers must design, implement, and assess ICT practices suitable for their ecosystem's exclusive conditions. Moreover, ICT teaching practices entail sociocultural processes in which professionals must link their ecosystem's specificities to broader dimensions. In this sense, Lim et al., (2013) suggest that:

The school is dependent on the other larger ecological systems (for example, the education system and society) within which it is embedded; a change of culture in the broader context, a switch of institutional setting, or an introduction of an innovation is likely to change the

learning outcomes of the students. The contexts at different levels may change over time, but they are always interdependent of one another (p. 62).

On the other hand, a large body of research reports that ICT practices must shift to more transformative uses that foster authentic learning among pupils (see box no.3 in figure 2). Besides, vast research and CPD have explicitly focused on the combined benefits of reflexion and CPD for increasing teachers' ICT practices (see box no.4 in figure 2). While access and technical proficiency among teachers have increased over time, the quality of ICT practices remains variable and inconsistent, as are the narrow assessments of their ICT teaching practices. Finally, seminal literature in the field of ICT in schools reports a gap between policymakers' expectations of what ICT use in teaching and what teachers can actually do with pupils (see box no.5 in figure 2). The main reason argued in these studies is that policymakers tend to work outside the classroom, therefore, general norms and regulations decontextualize from teachers' practical environment.

Figure 2. Issues associated with ICT practices⁷



Source: author's creation

Research on educational technology discloses different foci to investigate ICT practices, from discussing teachers' ICT competencies to analysing the impact of varied ICT uses on students' attainment. However, recent studies signal the need for more analysis that will focus on CPD to encourage reflexion among teachers (Carrillo & Flores, 2020; Hanney & Skirkeviciutey, 2019; Michos et al., 2018).

I argue that the starting point to understand and refine ICT practices should be teachers: their thinking, aims, and vision of the value of ICT. This idea resonates with the claim of Cox (2014) that "there is only limited understanding of teachers' pedagogical practices with a wide range of technology uses and in different subjects" (p. 35). Furthermore, she highlights the need to explore more

⁷ *References shown in appendix 2.

thoroughly how teachers choose and use ICT in teaching. This issue persists and seems more profound today due to the rapid transition from in-person to online and blended learning caused by the Covid-19 outbreak (Selwyn et al., 2020, Williamson et al., 2020). Focusing on teachers is pivotal because they catalyse and trigger learning among pupils. Therefore, comprehending how they make decisions about their ICT practices is crucial, as it can help them to cope with the issues mentioned at the beginning of this section.

Multiple scholars caution that, although teachers tend to assume that ICT automatically brings learning gains, such supposition results in a naïve and simplistic understanding of how ICT should be used and what their use can offer (Hinostroza et al., 2016; Kozma, 2003; Livingstone, 2012; Newton, 2012; Selwyn, 2011; Selwyn et al., 2020). In this sense, Williamson et al. (2020) argue that “...technology is not a neutral entity that simply does good when people have access to it – it is complex and social cultural artefact” (p. 111). Therefore, teachers are responsible for thinking carefully about designing, using, and assessing their ICT practices to safeguard the learning integrity and contribute to authentic learning experiences among students (Laurillard, 2012). Thus, reflecting regularly about the ICT practice is significant in an age where these devices and resources can offer multiple learning gains and have become more significant every day for schools (Fullan & Langworthy, 2014; Laurillard, 2012; Luckin, 2018). Although this idea seems to be a standard agreement in the professional and academic domains, the research reports that large-scale creative transformations of the ways in which teachers use ICT are still limited⁸.

ICT teaching practices should be considered a part of a broader cultural practice rather than isolated experiences (Crook, 2008, Williamson et al., 2020). However,

⁸ The references associated with this specific discussion are presented in figure 2 and appendix 2.

recent literature shows a critical issue that is a need to consider the broader ecosystem in which the ICT practice is embedded (Selwyn et al., 2020; Turvey & Pachler, 2018). This idea stresses the importance of a cultural disposition towards ICT practices, characterised by various forms of knowledge-construction, collective, critical, and creative thinking. In this sense, teachers and schools should pursue a clear vision and leadership regarding the role of ICT in practice. Such a vision should account for rich CPD provision, new considerations of the role played by the students in the use of ICT, steering for a greater commitment in their learning process. It also should redefine the learning spaces to develop enhanced teaching practices in different technological formats (i.e., in person, online, blended); and consider the impact of ICT on learning and teaching (Crook et al., 2010). As demonstrated later, the ICT reflexive practice (IRP) framework I present in this thesis proposes a way of understanding the interplay of these dimensions, enabling the further development of teachers' ICT practices.

The ideas I have discussed in the previous passages show how the understanding of ICT practices is complex. Such an understanding depends upon the interconnectedness of multiple features (Ertmer & Ottenbreicht-Lefwitch, 2010; Tondeur et al., 2017; Turvey & Pachler, 2018). These features include:

- A critical awareness of multiple ICT, their affordances, their characteristics, and purposes for their creation.
- Teachers' technical confidence and proficiency in manipulating them correctly.
- An awareness of the pedagogical approach that may facilitate technology-enhanced learning.
- The mastery of the content related to the subject area.
- The spatial and time configuration in which the ICT practice takes place.
- Collaboration with colleagues.

- CPD provision embedded in the teacher's daily work, among others.

These features are also related to the ways in which teachers design, implement and assess their ICT practices. They also imply integrating ICT in a broader socio-cultural context, which I refer to as the *school's institutional ecosystem* or *ecosystem* in my research. It is often assumed that the school's policy and wider institutional culture are inherently reflected in praxis; however, as evidenced by literature surveyed in this review, this is not always the case. In contrast, I will demonstrate how a group of teachers in my study shaped ICT reflexive practices with an awareness of the wider school ecosystem. This awareness and the teachers' agency to act upon (re)shaping their ICT practices are crucial for CPD and to develop ICT provision in ways that resonate with the wider contexts of their work.

In what follows, I discuss the research literature concerning CPD and teachers' ICT practices. As mentioned in the previous passages, research dealing with CPD and ICT signals a divorce among both areas. For instance, in Chile, most research reports various PD opportunities on ICT practices. However, policymakers tend to provide isolated programmes that take place outside and are often decontextualised from the teachers' professional ecosystem. This issue affects the quality and consistency of the practice over time. The same issue is recurrent in international research. Therefore, in the next section I delve into the concept of 'CPD', how it has been related to teachers' ICT reflexive practices and in what ways CPD enhances existing PD provision due to its long-term nature.

c. ICT practices in schools and CPD

Relevant studies in educational technology report the need to provide high quality and sufficient CPD opportunities to improve ICT practices⁹. One crucial concern among researchers is the lack of proper guidance and support. As a result, teachers' positive responsiveness to policymakers' expectations about effective ICT practices remains relatively low (Crook et al., 2010; Kozma & Vota, 2014). As I have mentioned, in the Chilean landscape's section, national and institutional policies tend to make considerable investments in ICT infrastructure, software, Internet connections and isolated professional development (PD) opportunities, resulting in little progress (Lavonen et al., 2012; Livingstone, 2012; Sánchez et al., 2011). Moreover, ICT integration in teaching and learning has naturally appeared due to technological developments outside schools. These initiatives seem to lack deep knowledge of the reality in which the teacher exerts their profession. Therefore, professional support for ICT practices have become a primary concern among academics¹⁰.

Before moving forward, it is vital to define the notion of 'CPD'. Drawing on multiple authors who have treated the notion in reference to ICT (Ertmer & Ottenbreit-Lefwitch, 2010; Jones & Younie, 2014; Hinostroza et al., 2010; Michos et al., 2018; Philipsen et al., 2019; Porayska-Pompsta et al., 2018), I generated my own definition of the concept. 'CPD' refers to providing learning opportunities to teachers in a wide range of areas (e.g., expertise on the teachers' subject domain, pedagogical theories and traditions, ICT practices, socioemotional and human development, among many others). Such opportunities may be given in different forms (e.g., a single course, a postgraduate programme, and others)

⁹ The references associated with this specific discussion are presented in figure 2 and appendix 2.

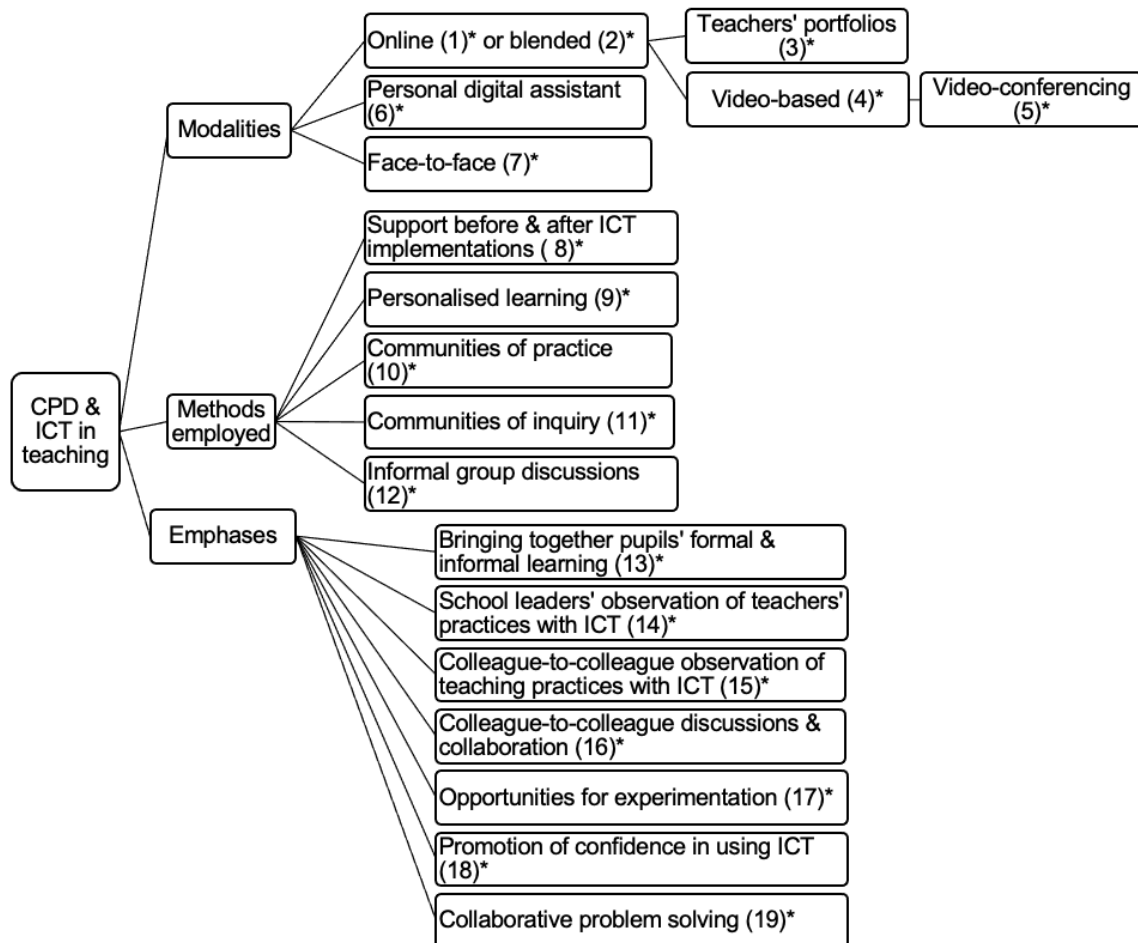
¹⁰ The references associated with this specific discussion are presented in figure 2 and appendix 2.

and happen in different locations (e.g., the school, a university, consultancy companies, along with others). The continuous character of the notion is critical to frame its definition. CPD entails all the opportunities I have mentioned above because it occurs throughout the teacher's entire professional career. In this sense, CPD is a lifelong learning process aiming to constantly improve the teaching practice in multiple areas.

Some authors, such as Maher & Shuck (2020), criticise the term 'CPD' due to its relation to top-down decisions, underestimating teachers' choices of their own professional learning. These scholars, therefore, prefer to use the notion of 'professional learning' because the concept positions the teacher as agentic and responsible for their own professional development. Despite this idea, I deem that professional development is more apt for my research because learning is a part of development. CPD is even more suitable as it suggests that professional learning be sustained throughout the teachers' entire professional experience.

Studies related to ICT, CPD and RP have explored the phenomenon from two perspectives: a) use of ICT as a means for reflexion or encouraging reflexion through different modalities (e.g., online, blended); b) use of diverse resources and methods for reflexion on ICT practices. This situation reveals that CPD about ICT practices are particularly varied and context specific. Therefore, a similar problem in teachers' ICT practices arises. Assessment and replicability of the impact of CPD on ICT have become highly problematic. The ICT reflexive practice framework I present in this thesis aims at providing a model suitable for different teaching contexts.

Figure 3. CPD programmes related to ICT practices¹¹



Source: author's own creation (Novoa, 2019)

¹¹ *References shown in appendix 3.

As shown in figure 3, there are multiple examples of specific PD opportunities that have used ICT to foster reflection. I will discuss two of them. Firstly, four studies agree on the effectiveness of videos to promote a deeper understanding of the practice (Hougan et al., 2018, Kassner & Cassada, 2017; McFadden, 2013; Moseley et al., 2016; Tondeur et al., 2013). However, they state that videos need to account for a clear assessment of the methods and pedagogical implications to value positively authentic reflexive experiences. Secondly, Samaras & Fox (2013) examined the use of e-portfolios by nineteen Greek schoolteachers in the United States as part of a CPD programme. Teachers designed and implemented their lesson plans in their countries and used e-portfolios to document their reflections about the experience. Findings indicate that the e-portfolios offered a cognitive climate for teachers to think about the practice and record their experiences as a life-long reflexive process. They also highlight the need for further sustained support for teachers in their understanding of the practice.

Different academics who have researched teachers' ICT practices in schools discuss the connection between ICT practice and CPD. For example, Ertmer & Ottenbreit-Lefwitch (2010) conclude that, when teachers are provided with consistent CPD, they tend to encourage authentic learning and increase the affordances of ICT, an argument that echoes other scholars' claims, such as Hanney & Skirkeviciutey (2019), Hernández-Sellés et al. (2019), Korhonen et al. (2019), and Pardo et al. (2019). This idea suggests that professional learning opportunities that encourage technology-enhanced teaching practices should remain over time.

The term 'continuous' is vital to professional development (Philipsen et al., 2019). As I have stated before, most scholars assume that isolated and short-term professional development (PD) programmes do not guarantee sustained and deep consciousness of the implications of teachers' ICT practices. For instance, Scherer et al., (2020) highlight the importance of shifting PD programmes to

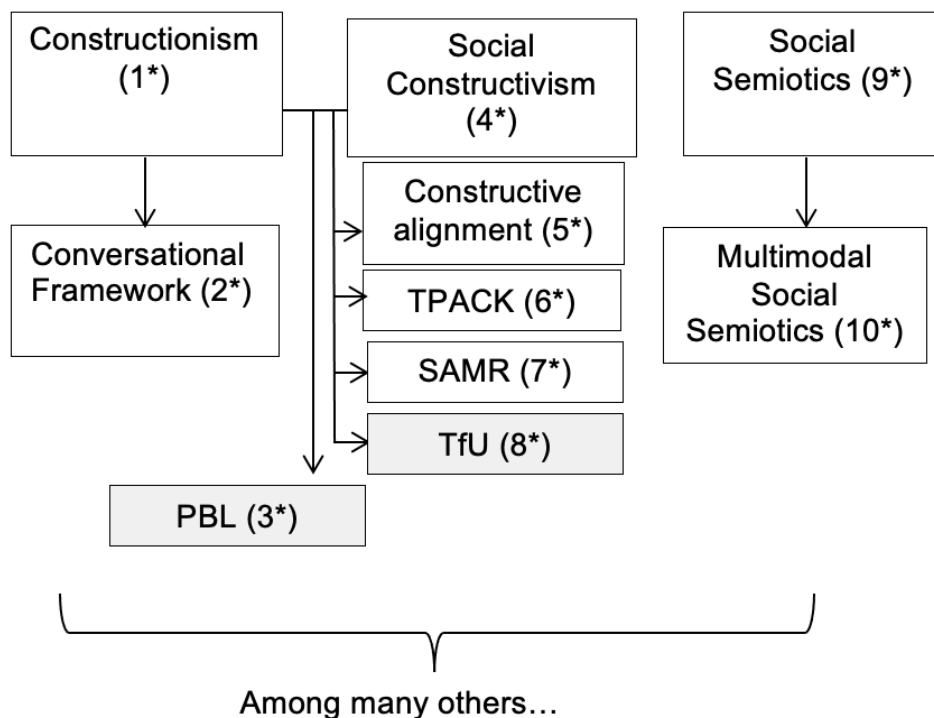
lifelong learning opportunities that follow up existing ICT practices to reduce potential barriers to technology use. Furthermore, Michos et al. (2018) caution that more empirical evidence of the connection between CPD and ICT practices is needed to increase our understanding of how reflexion can cultivate technology-enhanced learning. This issue persists in the context of the Covid-19 pandemic. In a study that explored teachers' readiness to transition from in-person to online teaching, Howard et al. (2020) found that teachers with medium or high level of willingness to online teaching perceived that ongoing professional development was crucial to sustain online learning and teaching practices.

The literature discussed in this section shows several issues of the practical uses of ICT in teaching. Such issues have been highlighted since the beginning of the 21st century and remain key issues today. This situation reveals that CPD of creative and innovative ICT practices is still needed. In addition, research regarding this matter has yet to be expanded (Tondeur et al., 2016). For the reasons above, the contribution of my thesis is the research and development of an ICT reflexive practice (IRP) framework that aids teachers and institutions to cope with the challenges examined in this section.

2. ICT reflexive practices as CPD embedded in the school ecosystem

'Reflexive practice' (RP) as a concept has been developed since the first decades of the Twentieth Century. John Dewey and Paulo Freire are two of the most representative authors who have arguably contributed much to the development of this term. Freire's (1998, 2005, 2011, 2014) and Dewey's (1910, 1914, 1922, 1960, 2001, 2010, 2012) theories are rooted in social constructivism. Based on these scholars and other contemporary researchers and theorists' discoveries related to educational technology, my philosophical position stands between the adherence of ICT practices to social constructivism and constructionism (Jonassen, 2000; Lave & Wenger, 1991; Laurillard, 2012; Luckin, 2018; Papert, 1980; Vygotsky, 1978). In other words, learning and teaching with technology involves complex socio-cultural actions, which are situated and dynamic; they highly depend on learners' self-regulation and autonomy as well as on a shift in the teacher's role in the 'zone of proximal development' (Vygotsky, 1978). From this viewpoint, the teacher designs consciously, offers support when needed and carefully assesses their ICT practices through reflexion. Figure 4 provides examples of theories and frameworks that have been linked in the academic domain to ICT teaching practices. The figure illustrates the multiple philosophical positions that can be found in the literature. Not all of them have been added to this section. However, I acknowledge the existence of many more, including behaviourism and cognitivism (Dede, 2008; Laurillard, 2012).

Figure 4. Examples of learning theories and frameworks in dialogue with teachers' ICT practices¹²

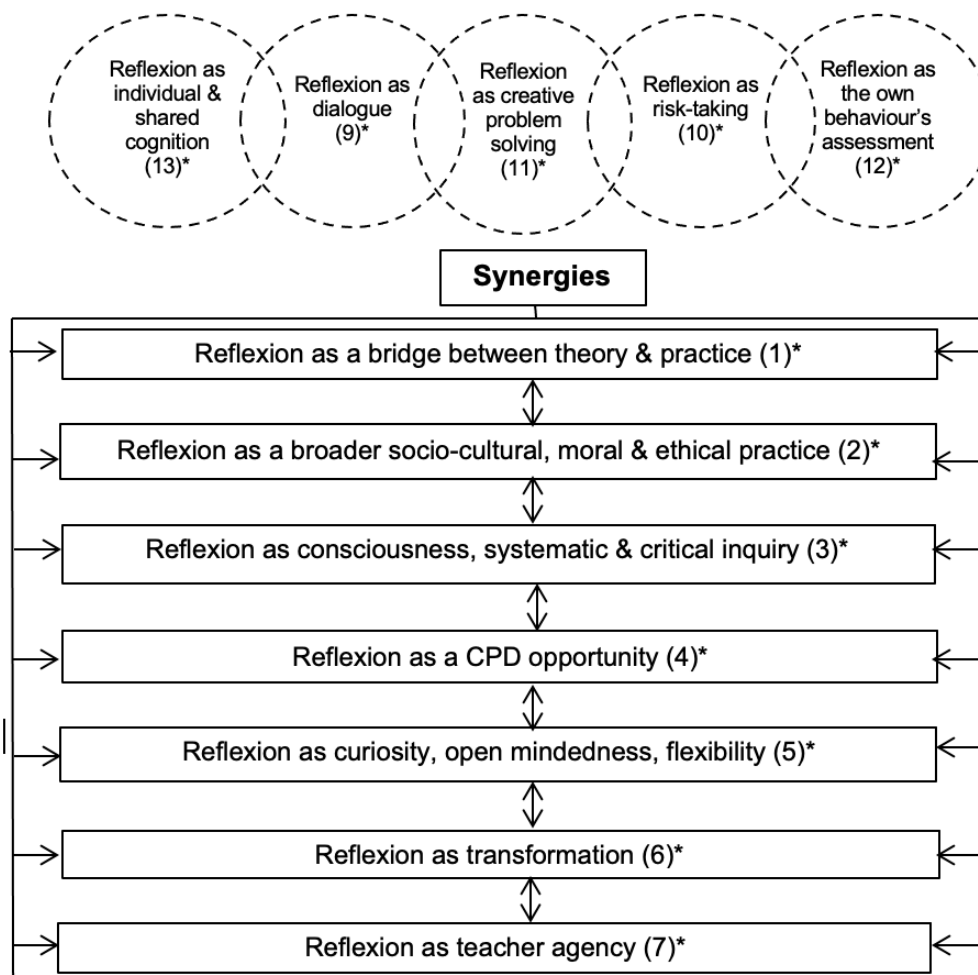


Source: author's own creation

In what follows, I will briefly portray the synergies and discontinuities I identified in Dewey's (1910) and Freire's development of 'reflexive practice'. It is important to show these two perspectives to understand what each scholar contribute to the broader understanding of the notion. In this way, Figure 5 shows the synergies between Freire & Dewey (see the boxes in the figure). It also presents each one's own ideas (see the circles in the figure). Following the figure, I will discuss the theory, its evolution until today, and my understanding of teachers' ICT practices.

¹² *References shown in appendix 4. TfU and PBL boxes are filled with grey because the school draws teachers' ICT practices on these two frameworks.

Figure 5. Freire's and Dewey's notion of 'reflexion'¹³



Source: author's own creation (Novoa, 2019)

Freire sees 'reflexive practice' as the twofold consideration of teachers' and learners' cultural experiences and the contents specific to the teachers' discipline

¹³ *References shown in appendix 5. Synergies between Dewey & Freire are shown in squares; ideas specific to each scholar are presented in circles. Although the circles represent specific ideas of each author, the historical development of the concept has revealed that they are interrelated.

or subject area (Freire, 1998; Freire, 2014; Freire & Nogueira, 1989). This idea means connecting theory and practice, which he labels as a dialectic and iterative process between text (theory) and context (the teachers' practical domain).

This scholar states that a reflexive practitioner develops various cognitive skills, such as creativity, critical inquiry, consciousness, dialogue, and collaboration. These skills allow educators to move from simple curiosity about the reality in which the practice is embedded, to an epistemological curiosity. The former is spontaneous and emerges from ingenuity; the latter comes from a true desire to increase knowledge, develops higher-order intellectual abilities such as those mentioned above, and allows learners and teachers as learners of their practices to appropriate knowledge. Therefore, the professional owns his or her practices and liberates from spontaneously accepting the external forces that might shape them (i.e., policies, economy, the sociocultural background). In this way, teachers' epistemological curiosity triggers a process leaning towards conscious enhanced teaching practices (Freire, 1998).

Following a similar viewpoint, Dewey (1910) argues that reflexive practice involves an incomplete understanding of reality. The fact that our comprehension of reality is partial motivates the practitioner to make pauses to observe the practice critically and consciously. Such a process involves a special sensibility on the part of the educator, which helps them to enhance diverse cognitive skills such as flexibility, open-mindedness, attention, systematic inquiry of the issues that occur in the teacher's professional practice, analysis and evaluation of resources, strategies, contents, as well as self-evaluation, comparison, and contrast with other colleagues' practices (Dewey, 1910; Dewey, 1914; Dewey, 1922).

Furthermore, through each of these skills, the teacher fortifies his/her decision-making in the practice, leading to increase agency¹⁴. According to Freire (Freire & Nogueira, 1989), the agency consists of the practitioner's capacity to know and understand the reality beyond the school's institutional boundaries. The notion implies being critical educators of their knowledge. To critically educate means to carry out a permanent vigilance of the own practice by analysing, synthesising, and assessing the learning and teaching experience. These actions presuppose searching for the reasons that explain the outcomes of the practice and investigating ways of refinement, increasing professional consciousness and responsibility. Responsibility entails ethical considerations of increasing pupils' learning. According to the educational psychologist, both teachers and students must be critical learners of their reality, and that is precisely what provides them with the agency needed to transform it: "For me, this is the first lesson of liberation pedagogy: that both teachers and students are critical agents of the act of knowing" (Freire & Shor, 2014, p. 60). This quote is key to understand reflexion as a form of liberatory practice. The purpose underlying this need of an ethical vigilance of reality is precisely to liberate the teacher from naïve practices, which automatically consent with the decisions imposed by the system almost by inertia, 'because they already exist' (Freire, 1998). This idea is crucial to the development of ICT teaching practices. We must return to the problem some scholars caution that teachers tend to see ICT as inherently positive for education (Hinostroza et al., 2016; Kozma, 2003; Livingstone, 2012; Newton, 2012; Selwyn, 2011; Selwyn et al., 2020), which brings us back to the discussion if ICT is neutral or a complex sociocultural artifact.

Like Freire (2014), Dewey (1914) highlights that a reflexive practitioner develops deep consciousness through theory and practice connectedness (Freire & Shor,

¹⁴ I will delve deeper into the concept of 'teacher agency' further in this chapter. In the meantime, I provide Freire's and Dewey's definition to support the conceptualisation of reflexive practice.

2014; Shor & Freire, 1987). In this sense, reflexion as a cognitive process is not only individual. Most importantly, it constitutes a collective activity. As education is socially constructed (Freire & Nogueira, 1989), reflexion implies moral and ethical dimensions, which must move towards increasing students' learning. Following this viewpoint, Dewey asserts that a reflexive practitioner faces a moral opposition "between the individual and the society" (pp. 184-185). In this sense, reflexion entails aspects that move beyond the narrowed student-teacher relationships.

Dewey (1914, 1922) asserts that teachers empower themselves when making choices adequate to their learners' needs and that concern the links between reflexion, agency, and ethics. Agency implies the teacher's freedom and emancipation from potential constraints generated outside but related to the actual practice (Dewey, 2001). Examples of such possible limitations could be the norms and regulations established by the institutional policymakers that do not coincide with the teacher's practical conditions.

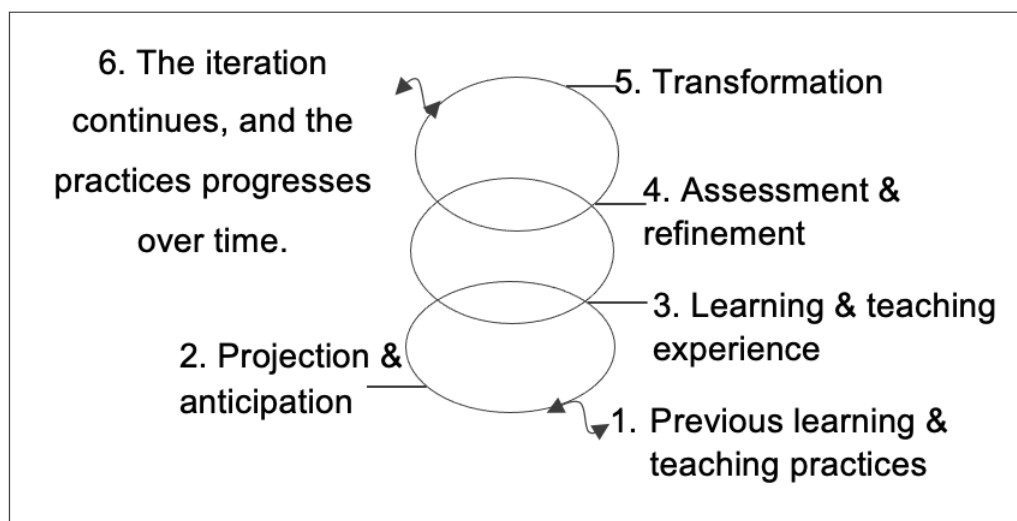
Because teachers make choices, individually and collectively, they act freely. However, freedom, in this situation, does not imply a lack of boundaries. The teacher must always have their learners in mind. Therefore, freedom presupposes acting responsibly for them (Freire, 1998). According to Dewey (1922): "When we use the law to foresee consequences and to consider how they may be averted or secured, then freedom begins" (p. 311). This quotation signifies that freedom is not arbitrary. When designing their ICT lesson plans, teachers must foresee the implications of their choices on students' learning. This idea seems to be obvious. However, the problem referred to the lack of teachers' knowledge and competencies on *how* using ICT to enhance their pupils' learning stresses its relevance.

Freire follows a similar viewpoint, sustained in a well-developed theoretical background, the liberatory practice, by highlighting that educators must make decisions collectively (Freire & Nogueira, 1989). In other words, while considering the broader context in which the practice is embedded, teachers make decisions with colleagues and other school staff. Even more, teachers should make decisions together with students. Such a process leads to democratic practices towards social liberation and permanent transformative teaching. Therefore, education constitutes a life-long learning process in which both teachers and pupils learn together about how to transform knowledge and reality. In his book *Pedagogy of Freedom*, Freire (1998) asserts that teacher professional development should move beyond technical preparation and focus on ethics to critically assess the global order's implications on the educational systems. In his view, multiple aspects surrounding the teachers' practical context shape their practice. Some examples may be the expectations of institutional and national policies, which often materialise through the curriculum.

Another significant example that has been seen as an extraordinary potential to ensure educational continuity during the Covid-19 pandemic (Crompton et al., 2021) but that has not been exempt from ethical issues (Selwyn, 2020) is precisely ICT. In a more recent publication (2005), Freire cautions that teachers must critically observe the technological advances and the immediate allure technology corporations might offer to educational institutions because there are ethical repercussions associated with its use. The purpose of developing holistic reflexivity is to be conscious of the personal and social dimensions that influence the practice and how these dimensions can shape it. In the case of ICT, my interpretation of Freire's view on 'agency' as an activity for freedom is not to neglect technology nor to stop making the most of it for education but to be aware of its implications and decide independently considering the conditions and the needs of the professional's specific teaching context. While conscious and

critical, the professional chooses autonomously, which differs from accepting the context by inertia.

Figure 6. Reflexive practice's iterative nature



Source: author's own creation

As I show in figure 6, reflexion takes the form of an iterative spiral in which the teacher foresees (e.g., designs the lesson plan), applies (i.e., guides the learning and teaching activity), assesses the experience, thinks about further refinement and ways of modifying the practice if needed, transforms the practice, foresees again, and so forth. Freire's (2014) understanding of reflexive practice as permanent iteration towards conceptual and practical change implies knowledge of the practice's broader ecosystem¹⁵. This idea is based on the belief that

¹⁵ As I have said before, the larger ecosystem consists of the school community. Some concrete examples of such ecosystem's members are institutional policymakers, colleagues of the same or other subject areas, and the students' lives, knowledge, and desires. Moreover, the educator must consider the broader macrosystem in which the institution is embedded. Examples of the macrosystem's constituents are the students' and teachers' families, their socio-cultural and socio-historical contexts, and what is crucial for this thesis, the ways in which technological developments influence the education system (Freire, 2005).

learning and teaching are socially constructed (Freire & Nogueira, 1989; Freire & Shor, 2014). In this sense, and as I have mentioned above, dialogue is pivotal to generating authentic reflexive experiences: “The openness of the dialogical teacher towards his/her own relearning provides to the use of dialogue a democratic character” [La apertura del profesor dialógico hacia su propio reaprendizaje recubre el uso del diálogo de un carácter democrático] (Freire & Shor, 2014, p. 163).

This idea is consistent with Dewey’s (1922) assertion that teacher democratic practices entail “(...) the realization of a form of social life in which interests are mutually interpreting and where progress and readjustment, is an important consideration” (p. 100). Democratic teaching leads to on-going transformative processes mutually agreed upon by each member of the school ecosystem.

From this point, transformation plays a critical role. A reflexive practitioner who complies with the conditions described above constantly innovates his/her practice to increase learning. In this sense, a reflexive practitioner must understand education “for a changing social order rather than education for a new social order” (Dewey, 1934, p. 99). That is to say that reflexion progresses and evolves over time. As shown in figure 6, transformation is permanent. Therefore, reflexive practice aims at constant refinement rather than drastic changes. The practice draws upon previous practices and is improved throughout the teachers’ entire professional life.

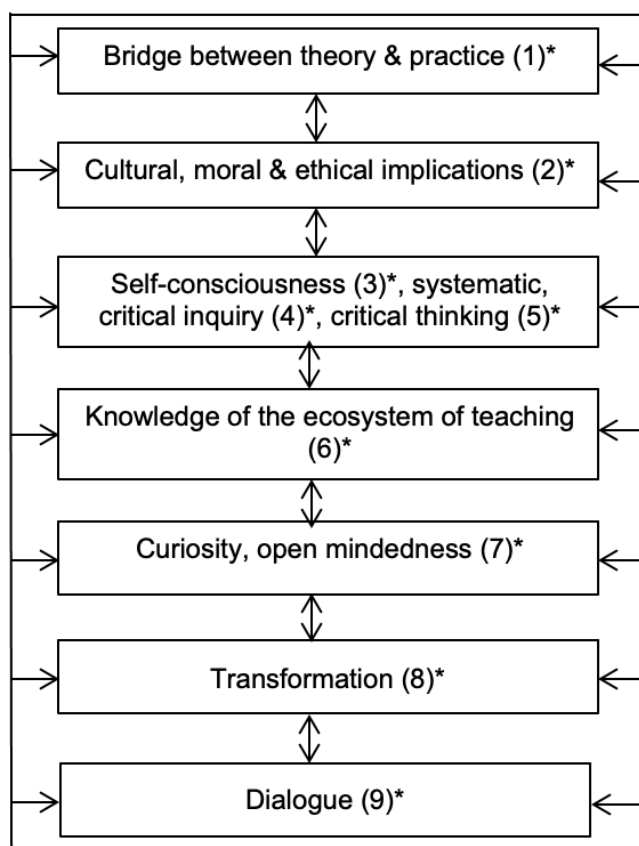
In the previous passages, I have discussed the synergies I have found in Dewey’s (1910, 1941 & 1922) and Freire’s (1998, 2005, 2011 & 2014) development of reflexive practice. However, it is also relevant to stress that each scholar stamps their own character on the concept. Freire contributes to the notion of teacher agency by understanding reflexion as a practice that emerges from dialogue, collaboration, therefore, social liberation (1998, 2011 & 2014). Dewey

emphasises teachers' cognition (1910) and democracy (1938) as a transformative practice without focusing as much as Freire does on the teacher's freedom from the socio-cultural, socio-economic and socio-historical pressures that might shape the practice. In this sense, it could be possible to see Freire's inclination to holistic reflexivity. On the other hand, Dewey (1910, 1914, 1922 & 1938) reveals a greater focus on the intellectual systematicity teachers need to conduct reflexion within such a holistic approach. Both scholars aim at increasing teachers' agency through their development of reflexion (Dewey, 1910, 1922 & 1986; Freire, 2011, 2014, Freire & Nogueira, 1989).

Following Dewey's and Freire's primary elements that together define 'reflexive practice', I briefly expose in the following passages the notion's treatment by other scholars to show how each of them share elements of the theory discussed above. Moreover, I explain my own development of the term in reference to teachers' ICT practices.

From 1980 onwards, reflexive practice (RP) has evolved and covered multiple terminologies, each of which share elements with Dewey's and Freire's theories (See figure 7). Different researchers report diverse understandings of RP, although they agree on the importance of 'reflexion' to make sense and refine educational practices (Samaras & Fox, 2013; Sellars, 2012). There is a vast literature related to RP that shows three lenses from which practitioners can develop 'reflexion'. These perspectives iterate and interplay configuring and reconfiguring teachers' decision-making (Freire, 2005; Freire, 2011; McFeetors, 2008; Michos et al., 2018; Mitchell, 2017; Taylor et al., 2015). Figure 7 shows how these ideas have been taken up in the work of more recent scholars and how their formulation draws on and/or expands beyond Freire and Dewey's frameworks.

Figure 7. Dewey's and Freire's notions in recent literature¹⁶



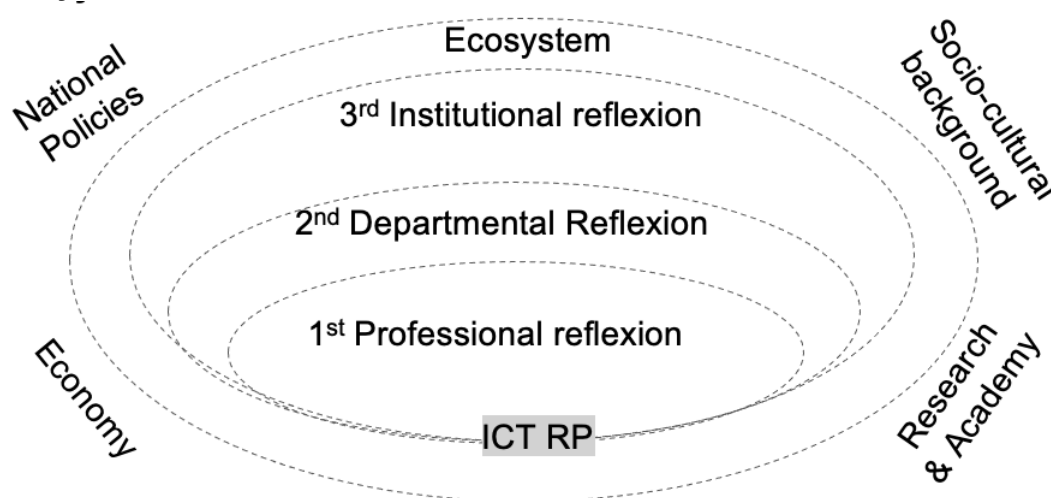
Source: author's own creation (Novoa, 2019)

From the investigation of 'reflexive practice', I have developed my own conceptualisation and applied it to the problem associated with teachers' ICT practices. Figure 8 portrays such an understanding by showing the synergies I have identified in the relevant literature regarding reflexion and ICT practices (Bleakly, 1999; Dewey, 1910, Dewey, 1922; Freire & Nogueira, 1989; Michos et al., 2018; Philipson et al., 2019). The figure shows how teachers, through reflexion, should consider different dimensions and features of the school daily life. In this way, reflexive practice about ICT is located at the convergence of three circles, representing different layers or dimensions of the school ecosystem. The

¹⁶ *References shown in appendix 6.

circles are presented with penetrable lines to show how each reflexive layer or dimension (see the first, second and third circles) intertwine within the school ecosystem, which in turn is embedded in a larger macrosystem that can be composed of the national policies, the school community's socio-cultural and sociohistorical backgrounds, among other dimensions and features.

Figure 8. ICT reflexive practice as CPD embedded in the school ecosystem¹⁷



Source: author's own creation

Drawing on this representation, I argue that RP should account at least for three interrelated and iterative dimensions:

1. the individual or personal thinking about the ICT practice (i.e., first circle);
2. the social or collective thinking regarding the use of ICT (i.e., second circle);
3. the institutional priorities, norms and regulations related to ICT practices (i.e., third circle).

¹⁷ Note: ICT RP = Information and Communication Technologies Reflexive Practice.

The teacher's individual reflexion refers to the professional layer and facilitates a better understanding of the ICT practice in relation to their subject domain and pedagogical knowledge expertise (Koehler & Mishra, 2009; Koehler et al., 2013). It is associated with questioning one's own actions, behaviours, beliefs, and prior thinking to transform the practice over time. Through individual reflexion, the teacher develops different skills, such as creativity, critical thinking, and metacognition, to increase their consciousness¹⁸ of the practice. Criticality can help teachers assess the positive outcomes and the aspects of a given ICT use that need further refinement¹⁹. This idea coincides with Selwyn et al. (2020) claiming that research and teacher professionalism must engage with educational technology from a critical perspective.

The departmental or social reflexive dimension has two components: dialogue and collaboration. According to Freire, dialogue "(...) is the moment when humans meet to reflect on their reality, the way they make it and remake it" [El diálogo es el momento en que los humanos se encuentran para reflexionar sobre su realidad, la manera que la hacen y la rehacen] (Freire & Shor, 2014, p. 159). In this sense, the concept moves beyond the professional to shared thinking and decisions. From the reflexive practice viewpoint, the teacher must interact with other school members (e.g., colleagues) when searching for the best ways for ICT to enhance learning (Albion & Tondeur, 2018). The practitioner is required to consider social territories, such as the students' or colleagues' perspectives, as well as the institutional expectations and visions concerning the ICT practice (Bleakly, 1999; Copeland et al., 1993; Day, 2015; Hunsaker & Johnston, 1992; Markham, 1999).

¹⁸ I will delve deeper into the concept of 'consciousness' later when discussing teacher agency. In the interim, it is essential to highlight the concept as part of the personal dimension because it implies assessing how we act as professionals.

¹⁹ The references associated with this specific discussion are presented in figures 2 and 3, and appendixes 2 and 3.

Dialogue adds a new layer. Such a layer is interwoven with the professional dimension and allows teachers to generate new perspectives regarding their ICT practice. The voices of the teacher, colleagues, school authorities, and even students can merge through dialogue, facilitating a better understanding of the practice and helping them adopt decisions that aim at constant improvement. The internal and the external -text and context, theory, and practice, personal and social- unify through dialogue (Freire, 2011; Freire, 2014) to facilitate innovative ways of professionalising the ICT practices.

Dialogue involves thought and discussion; collaboration entails collective decision-making and actions. In this sense, collaboration constitutes a form of democratic teaching (Benade, 2015; Dewey, 1922; Freire, 2014), which leads to intellectual freedom (Benade, 2015; Dewey, 1922; Freire, 2014), self-regulation and horizontal relationships between educators, school authorities, and students, among other members of the ecosystem (Mitchell, 2017; Taylor et al., 2015).

All these aspects are crucial to enhance teachers' professionalism (Whitty, 2008) because they facilitate possibilities for educators to increase agency. I will delve deeper into the concept of 'teacher agency' later in this chapter. In the interim, I highlight the significance of carefully balancing the school's policies regarding ICT usages and the practical conditions that may facilitate or hinder such a use. This idea resonates Dewey's (1922) assertion that:

It is reasonably obvious that organization may become a hindrance to freedom; it does not take us far to say that the trouble lies not in organization but in over organization. At the same time, it must be admitted that there is no effective objective of freedom without organization (p. 306).

Suppose we apply this quote to the teacher's ICT practices. In that case, the professional must carefully balance the policy regarding ICT with the conditions they face in his/her everyday school dynamics to avoid choices imposed from the broader institutional layers and develop collaborative decisions for the learning community's good (Albion & Tondeur, 2018; Freire, 2011; Freire, 2014; Freire & Nogueira, 1989). In summary, the interactions between professional, departmental, and institutional reflexive layers, or what I will further detail in the latter part of my research as 'reflexive dimensions', help make sense of the practice outside the educator's narrow thinking (Freire, 2011). At the same time, it allows the institutional authorities or policymakers to understand better the everyday situations that affect teachers' decisions about their ICT practices.

The teacher as a decision-maker suggests having autonomy to make choices in the shaping of a particular learning environment. Multiple scholars define RP as a form of CPD that fosters agency, (Dewey, 1910; Dewey, 1922; Freire, 1998; Freire, 2005; Freire, 2011; Taylor et al., 2015). I believe that teacher agency is pivotal to enable reflexive ICT practices. In what follows, I further discuss this concern in relation to previous research and CPD literature.

a. Agency specific to teachers' ICT practices

Another related notion to ICT reflexive practices is 'teacher agency'. Tallvid (2016) mentions that the role of ICT changes every time educational practices transform. Therefore, academics should look closely at "how teachers describe and explain their practical use of technology" (p. 516). It is essential to remind the audience that teachers are the professionals in the front line, that is, in direct contact with pupils. They know the specific conditions that can enable or impede authentic learning experiences among them. Therefore, a balance between the school policies on teachers' ICT practices and the teacher's own capacity to make autonomous decisions is needed (González et al., 2020; Damşa et al., 2021;

Lowyck, 2013). Despite the recognition of the relevance of teachers' agency in the digital age, Player-Koro et al. (2018), argue that:

...it is increasingly recognized that teachers often have little agency in determining 'what can be said' and 'what can be thought' about education policy (Ball et al. 2011b, 611). At best, the role of teachers in policy networks is as relays/interpreters to 'think about, perceive and act towards policy in particular ways in local circumstances' (Ball et al. 2011b, 611). All told, it is worth exploring further how teachers and schools play are involved in the policy work surrounding an area such as educational technology (p. 685).

The quote presented above indicates that teacher agency is a necessary condition as well as an outcome of reflexion to develop conscious policies on teachers' ICT practices that consider the baseline and the broader dimensions that may shape the practice. I have mentioned before that a reflexive educator makes choices and acts freely to safeguard authentic learning among pupils. Broadly speaking, the concept of 'agency' is crucial to ICT because humans have widely used them. These technologies are present in our daily lives, implying that our ICT uses constitute complex socio-cultural practices. Users act and interact within and across hybrid (i.e., virtual and physical) contexts, consuming, generating and sharing content, modes of representation, forms of leisure, among other things (Pachler, et al., 2010). Following this viewpoint, users must be aware of the implications of their actions within such a complex environment.

Concerning teachers' ICT practices, 'agency' may help them move from understanding ICT as information providers to promoting knowledge-building and higher-order skills, such as critical thinking, creativity, and metacognition (Albion & Tondeur, 2018). In this way, teachers and learners as ICT users are not passive

consumers of content. They instead get involved in the construction of knowledge, contexts, learning-teaching spaces, and experiences.

In reference to ICT teaching practices, 'agency' is often linked to the professional's capabilities and opportunities to decide and make a difference in their ICT practices (Albion & Tondeur, 2018; Biesta et al., 2015; Damşa et al., 2021; Jones & Charteris, 2017). Relevant literature concerning ICT in education uses the term 'capability' and other related terminologies (e.g., skills, aptitudes, abilities) because agency refers to teachers' performance. The concept also concerns how they express their knowledge about the use, the subject they teach, and the pedagogies underlying their ICT practices (Loveless & Williamson, 2013). They also employ the term 'opportunity' because 'agency' deals with the provision of professional learning (Albion & Tondeur, 2018).

Moving beyond this perspective, Damşa et al. (2021) examine the notion of teacher agency in the pandemic context, to assess how teachers have responded to the emergency shift from in-person to online teaching. They suggest that teacher agency is much more complex than the ability to decide. The concept must entail the teachers' ecosystem, the technologies they use, professional learning provision, resources, collaborative decision-making among other features of their specific organisational contexts. In their viewpoint, agency must account for a holistic approach, including iterative, evaluative, and projective, therefore, transformative dimensions. Agency, then, consists of teachers' capacity to decide and act freely as well as learning opportunities provided to facilitate such decisions and actions, in this case, regarding ICT teaching practices by considering the complexities involved in their ecosystemic conditions and even beyond (Bleakly, 1999). Agency is intimately linked to reflexion because the notion itself implies transformative, evolutionary, teaching practices throughout the teachers' professional life.

Agency is pivotal in the digital age, especially in the changing conditions imposed by the Covid-19 pandemic. In this respect, Carrillo & Flores (2020) claim that “(...) issues of agency, responsibility, flexibility and choice are key elements, as are ‘careful planning, designing and determination of aims to create an effective learning ecology’” (p. 467). This idea is consistent with the theory of RP and my own development of the notions I discussed in the previous section. Reflexion and agency imply the ethical issue of being accountable for increasing students’ learning. Therefore, teachers are responsible for designing lesson plans suitable to their learners’ needs (Laurillard, 2012).

Teacher agency through reflexion as CPD implies integrating the teacher’s theoretical knowledge²⁰ with the own practices and teaching contexts (Freire, 2005; Freire, & Nogueira, 1989). Following this perspective, Freire (2011) sustains that: “The theoretical discourse itself, necessary for critical reflexion, must unavoidably be concrete so that it is almost confused with practice. As an object of analysis, the epistemological distancing from practice should bring it closer as much as possible” [El propio discurso teórico, necesario a la reflexión crítica, tiene que ser necesariamente concreto que casi se confunda con la práctica. Su distanciamiento epistemológico de la práctica, en tanto objeto de análisis debe “aproximarlo” a ella al máximo] (p. 40). In this way, a reflexive school is composed of teachers who constantly bridge the context with the ICT practice’s learning theories. Following this viewpoint, Gore (2020) highlights that teachers can produce theories founded in practice, generate significant context-specific knowledge, and contribute to the existing theoretical standpoints regarding how people learn and education professionals teach. In this sense, while agency increases over time through reflexion, the opportunities for theoretical growth also extend.

²⁰ The theoretical knowledge implies knowledge of the pedagogical theories underlying the ICT and expertise on the subject taught by the professional.

As reflexion, teacher agency entails professional and departmental dimensions (Freire & Nogueira, 1989; Freire & Shor, 2014). For instance, sharing ICT practices with colleagues may help find evidence to validate or transform their own teaching experiences with technology (Albion & Tondeur, 2018). Regarding this specific point, Gore (2020) claims that:

The premise of collaborative conversations is that teachers need time to converse in ways that will enable them to develop solutions to their own problems of practice, according to their needs. It involves an iterative process of asking questions, examining evidence and thinking about what the evidence means in a particular context (p. 206).

In other words, having a productive discussion with colleagues provides multiple angles, perspectives and ways in which ICT can be used in practice. Some experiences may coincide; others can reveal opportunities for refinement. In any case, the result of such a collaborative activity will be increasing the teachers' possibilities to make decisions and learn with others. As I have said, these are two critical components of agency. Furthermore, teachers and students together develop agency when participating in the learning and teaching experience. In line with social constructivist and constructionist traditions, Freire (1998) deems that both teachers and learners nurture each other while experiencing learning. This idea echoes Liu & Chao's (2018) claim that: "In the classroom situation, learners and teachers may need to work together in order to perceive, take action, and bring about the best possible learning experience. In other words, both learner and teacher agency are needed" (p. 71). In this way, each agent (i.e., the teacher and the student) make decisions and choices according to their roles in the learning experience, leaning towards new knowledge development.

Drawing on the action learning (AL) theory, Maher & Shuck (2020) stress the significance of considering their fellow teachers' viewpoints to increase professional learning, therefore, teacher agency. Through collaborative professional learning (which they labelled as internal facilitation), teachers share thoughts, experiences, inquire together, resolve issues associated with their ICT practices, among other professional learning benefits. In fact, these scholars suggest that colleague-to-colleague collaboration is pivotal because "(...) while teacher agency is essential for their learning, the presence of an internal facilitator in the form of a school leader is very important for ensuring that the opportunity, time and encouragement to participate occur" (p. 533). Regarding the institutional support (catalogued by the authors as external facilitation), the authors mention that a horizontal approach is needed to understand and develop agency through professional learning opportunities.

I have said before that reflexion and agency are iterative (Damşa et al., 2021), ongoing, and multi-directional. They are shaped by previous experiences, fashioned by current circumstances, and reformulated for further professional development (Gore, 2020; Freire, 2005; Freire, 2011; Freire, 2014). In this way, reflexion and agency configure teachers' practices in an education scenery where ICT has taken a significant place.

The iterative nature of reflexion has been stressed by Dewey (1910). He sustains that in any educational practice, "...projection and reflection, going directly ahead and turning back in scrutiny, should alternate" (p. 217). Thus, agency moves back and forth, creating, and renovating choices regarding ICT teaching designs, strategies, and assessment methods. This idea persists today. For instance, regarding teachers' collaborative decision-making, Gore (2020) highlights that: "(...) it involves an iterative process of asking questions, examining evidence and thinking about what the evidence means in a particular context" (p. 206). This excerpt not only implies the iterative nature of reflexion and agency. It also shows

that agency involves collaborative experiences based on dialogue and the generation of thoughtful teaching designs, in the case of this research, concerning ICT. Such a collaborative agency entails constructive feedback and permanent research about the ways in which ICT can be integrated into the teachers' subject domain and pedagogical background. The author also stresses its importance to increase trust among colleagues and making conscious choices. In summary, agency and reflexion "(...) involves not simply a sequence of ideas, but a consequence—a consecutive ordering in such a way that each determines the next as its proper outcome, while each in turn leans back on its predecessors" (pp. 2-3).

Reflexive practice that fosters teachers' agency regarding their ICT practices should involve increasing the professional's self-consciousness. In the extent to which the educator increases self-consciousness, he/she gains more flexibility and can question his/her choices and actions more freely. Therefore, real reflexive educators can decide critically how to enhance the practice, in this case, with ICT: "The more I assume how I am being and perceive the reason(s) for why I am this way, the more capable I become of changing, of promoting myself". [Cuanto más me asumo cómo estoy siendo y percibo la o las razones de ser del porqué estoy siendo así, más capaz me vuelvo de cambiar, de promoverme] (Freire, 2011, p. 40).

Teachers' consciousness concerning ICT practices should increase throughout their professional life. Enhancing consciousness through CPD is essential to understand better the implications of each decision in students' learning. Then, reflexion embedded in the school as a CPD model entails consciousness about being a professional, how others affect the teacher's own decisions, time, space, structures, and institutional policy, among other aspects (Gore, 2020; Shor & Freire, 1987). The ICT reflexive practice framework I develop in this thesis

illustrates how the school ecosystem can provide the reflexive practitioner with a collective thought and action model towards technology-enhanced practices.

In summary, reflexion is a life-long learning process. The practice evolves in a continuum but changes over time. When transformation is based on conscious reflexion, the practice becomes more and more meaningful, and teachers increase their agency. In this sense, the notion constitutes a CPD process that aims at refining teachers' ICT practices throughout the profession based on decisions that are coherent with the institution but, at the same time, make sense to them as professionals operating inside such an ecosystem (Dewey, 1922; Freire, 2005; Freire, 2011; Michos et al., 2018). Following this viewpoint, Dewey highlights that the practice becomes significant for education professionals when they understand reflexion as change: "...if change is genuine, if accounts are still in process of making, and if objective uncertainty is the stimulus to reflection, then variation in action, novelty and experiment, have a true meaning" (Dewey, 1922, p. 310).

When teachers can make their own decisions according to the specificities of their teaching conditions, they can generate unique contexts that make sense to them and their learners. In what follows, I will discuss two perspectives on the notion of user-generated contexts (UGCs). As I will explain later, these approaches combined with reflexion as dialogue and collaborative agency constitute a framework for teachers to make sense of and refine their ICT practices over time.

3. ICT Reflexive practices and User-Generated Contexts to foster teacher agency

It is pivotal to discuss the learning context in which the ICT practice occurs because it is usually much more complex than a learning situation that does not

include an ICT. Using ICT in the classroom entails the combination of physical and virtual environments. This situation makes the interactions among users more complex. In this vein, Luckin (2018) sustains that the learning context “has an impact on the learning process and the gains made by learners” (p. 21). Following this perspective, teachers choose ICT and the ways in which they decide to use them influence the possible learning affordance. On the other hand, the consideration of the ecosystem’s particularities also impacts the outcome of the ICT practice. In this section, I will discuss how teachers, while using ICT with pupils, generate unique contexts suitable for their specific learning and teaching needs. While producing them, they consider specific features, such as their relational dynamics, interfaces, physical and virtual interactional boundaries, location, space, and time, among others. While considering these features, they personalise the learning and teaching experience with ICT according to the specificities of their school ecosystem, increasing autonomous decision-making. This situation stresses the relevance of examining reflexive practice, ICT and UGCs together as a form of CPD that fosters teacher agency.

Before moving forward, it is essential to highlight that I will draw my investigation on two traditions (i.e., Dourish, 2016, 2017, and Luckin, 2010, 2018). However, there are other approaches to the notion, such as Bachmair, 2017; Bachmair & Pachler, 2014; Bachmair et al., 2018; and Pachler and colleagues (Seipold & Pachler, 2011; Seipold et al., 2014). I will draw on the first two scholars for different reasons. Firstly, although Pachler and colleagues’ development of UGCs is compelling for the field of educational technology, their specific focus on mobile learning is more generative to organisational and sociological studies than the convergence of ICT teaching reflexive practices and CPD. On the other hand, although Dourish (2004) and Luckin (2018) place emphasis on pupils, understanding teachers as lifelong professional learners (Freire, 1998) makes it easier to extrapolate their development of UGCs to the teachers’ consciousness about their ICT practices.

a. Contexts and the embodiment of material and immaterial stuff

The Scottish computer scientist Paul Dourish (2004) defines 'context' as the complex interaction between different features that influence the outcome of a given learning and teaching experience, which include: spatial, temporal, social, cultural, historical, and organisational backgrounds, people, material and immaterial stuff (or what we call 'digital' to refer to webpages, software, social networks, among other virtual spaces), locations, among other features that shape the learning experience. Contexts are complex, flexible, and dynamic. ICT users generate them after a decision-making process that carefully considers the abovementioned features. The features move beyond the user's personal experience to acknowledge how they learn with ICT and how their interactions with technology and others allow them to discover new knowledge, understandings, perspectives, and representations of existing knowledge.

Suppose we apply the ICT use to the teacher as a designer of a given ICT practice (Laurillard, 2012). While generating a new UGC, the professional develops reflexion and constantly moves from professional to broader dimensions associated with the school ecosystem and even beyond. He or she thinks about the devices, virtual and physical spaces through which learners will interact, how they will interact through these spaces, where and how will these spaces be located, how these spaces will be organised, how long they will use them, how time will be structured to achieve expected learning gains, among other considerations.

According to Dourish (2009), while learning with ICT, people interact with material and virtual resources, which are never entirely immaterial because they are stored in hardware and devices. They are present in a 'real' world, 'real' spaces, and 'real' time. People and the resources they use to learn are embodied, so are

interactions and conversations among them. Such an embodiment produces the context suitable for a specific group of people and affords specific learning outcomes.

Dourish (2017) discusses the term 'frame' between different bodies and contexts. For instance, there are physical frames between one classroom and another. However, establishing virtual and physical frames becomes a highly problematic issue when thinking about ICT teaching practices. The user's experience is carried out simultaneously in multiple environments (e.g., in-person and digital) when interacting through ICT. For instance, although programming takes place in a 'virtual' platform, the webpage is displayed and stored on different devices (i.e., the computer and the server). Therefore, the virtual environment (i.e., the programming webpage) is embodied with physical features that enable interaction.

Similarly, Bachmair & Pachler (2014) develop the concept of 'boundary blurring' to connect the research field of UGCs with mobile learning. The authors argue that the boundaries between contexts have vanished because users interact through mobile devices' applications (e.g., social networks) while staying in specific physical spaces, such as the bedroom or a coffee shop. Establishing the limits between both 'spaces' is difficult because of the ubiquitous nature of mobile technologies. The person lives the same experience in hybrid contexts.

As the reader will see in the findings chapter, when teachers design a programming learning and teaching experience, they must consider the frames that outline the activity. Will the experience take place inside a room? How will the furniture be organised? Will learners use an online platform? Which device will allow students to access the platform? What kind of Internet connection do they have? What kind of induction do learners need before using the platform? All these questions deal with the contextual features available to make sense of

the learning and teaching practice. An exciting idea referred to the complexities of ICT learning and teaching contexts is given by the embodied interactions generated between the users, the resources, devices, peoples, locations, spaces, and so forth. Teachers need to be aware of all these features to make the most of ICT possible. They must acknowledge the frames or boundaries between them to assess the extent to which they can move beyond them or not.

b. The Ecology of Resources to personalise learning

Inspired by Lev Vygotsky's (1978) social constructivism, Rose Luckin (2018) developed a similar approach to UGCs, although her primary focus is on the learner's personalisation. In her view, context is a complex set of interactions between place, space, locations, resources, devices, people, and disciplines. It is dynamic and associated with the user's motivations and intentionality. Moreover, context is informed by her interpretation of Vygotsky's (1986) Zone of Proximal Development (ZPD). The ZPD consists of an 'integrated cognitive system' (Crook, 1991, p. 83) that results in collaborative interactions between novice (i.e., the learner) and more expert agents (e.g., the teacher, a peer) in the learning process. Such interactions result in the solution of a problem or the creation of new knowledge upon an existing one. Luckin (2010, 2018) adds different sub-categories to the notion, such as the Zone of Collaboration (ZOC), which highlights learning as social by nature. Therefore, the ZOC emphasises the role of teachers, peers, parents, and other school community members in safeguarding learning. The ZOC is composed of two sub-concepts:

- a) the Zone of Available Assistance (ZAA) or all the resources that can aid learners to achieve the potential learning affordances of a given ICT use;
- b) the Zone of Proximal Adjustment (ZPA) or a sub-set of the ZAA, which corresponds to the specific resources and interactions that are only suitable to a single learner (it implies personalised learning).

An EoR can include the specificities of the subject area, the social, physical, and digital environments with which the learner interacts, and other resources that together yield a learner's ZAA (Luckin, 2010). While designing a learning and teaching experience with ICT, the teacher must consider the following features and resources of the learner's ZAA: books, pens, paper, other people who will interact with the learner during the learning experience, other people who know the learner and might influence the learning experience (e.g., family members), the experience's location (e.g., the school), space (e.g., the classroom, a 'virtual'/web space), among other features and resources. In Luckin's view (2018), teachers as designers of the ICT practice must also acknowledge the relationship between these elements. Moreover, they and their pupils must understand and make sense of such a relationship.

Following Vygotsky's (1978, 1986) socio-constructivist tradition, Luckin finds it essential to place the learner at the centre of the EoR. In other words, teacher and student agency are pivotal to making the ICT practice authentic. In her view, teachers and learners are active participants in the learning processes mediated by ICT (Luckin et al., 2011), generating democratic climate that blurs boundaries between the agent who teaches and the agent who learns. This idea echoes Freire's (2014) claim that both educators and pupils nurture each other during the learning experience.

Drawing on the idea that learning is social and situated (Freire, 2014), contexts are dynamic and intertwine with other contexts participating in the school organisation. Following this idea, the boundaries between users and the designers of a given ICT can vanish (Luckin et al., 2011). That is to say that a specific technology can be created for particular purposes. However, users can give another meaning and use it according to their conditions and learning needs. For instance, while blogs or word processors naturally appear to foster writing

skills in English or Spanish, they can also foster creativity by acting as an online students' art gallery or a music archive.

The findings chapter will illustrate these ideas deeper. The central idea I would like to highlight in this section is that teachers generate unique contexts suitable to their specific learning and teaching conditions while designing, implementing, and assessing their ICT practices. Either by labelling them 'EoR' or 'embodied interactions', this thesis' teacher participants carefully designed exclusive contexts in which the ICT chosen afforded specific kinds of learning. While considering their contexts' features (e.g., time, space, location, interactions, among others), teachers consciously decided 'why' and 'how' to use ICT in practice.

Although it has not been evident in the literature I surveyed for this research, I find an intimate relationship between ICT, RP, UGCs, and CPD. Moreover, I recognise the significance of investigating these concepts together to understand teachers' ICT practices and integrate them in their professional learning, which should be deeply rooted in their school ecosystem. Reflexion is ongoing, cyclical, and iterative. The connection between the notion, UGCs and CPD can be a substantial opportunity to increase teachers' agency and bridge the existing gap between policy and practice. After discussing the main issues associated with these concepts, the next section will delve deeper into the research design and methodology.

Part 2. Research Design & Methodology

Chapter 3. Case study design

In the literature review, I discussed three issues relevant to the fields of educational technology and teacher professionalism: a) a policy and practice gap; b) a theory and practice gap; and c) a lack of consistent CPD about teachers' ICT practices. These three problems are associated with a lack of reflexive opportunities for practitioners that allow them to move beyond their classroom experiences to consider how the interplay of the school ecosystem's specificities shapes their ICT practices. For this reason, it was essential to focus my research on one school ecosystem that could illustrate how teachers carried out their ICT reflexive practices while generating exclusive contexts to their learners' needs. Therefore, I decided to conduct a case study design. I examined one institution or school ecosystem as a case, comprising six sub-cases linked iteratively. These sub-cases exemplify ICT reflexive practices (IRP) within the same school ecosystem. This delimitation of cases responds to the research aims and questions and the problem I have posited in the literature review (Yin, 2018). In other words, my decision follows Bryman and other scholars (Yin, 2018; Tight 2017) that case studies can focus on the particularities of a single organisation that represents the problem identified in the literature.

Case studies allow the researcher to develop an in-depth understanding of a specific phenomenon (Perryman, 2011; Yin, 2018). Regarding my thesis, the case study allowed me to gain rich information about how teachers think, use, and propose further amendments of their ICT practices according to the specificities of their institutional ecosystem (Benade, 2015; Bogdan & Biklen, 2006).

Case study research usually emerges from the need to understand complex social phenomena, such as the ICT integration in education. It enables

researchers to deepen on a specific situation or 'case' and gain a holistic viewpoint regarding the phenomena being studied. Cases could include "individual life cycles, small group behavior, organizational and managerial processes, neighborhood change, school performance, international relations, and the maturation of industries" (Yin, 2018, p. 5).

Different researchers develop diverse classifications of case studies (Bryman, 2012; Tight, 2017; Yin, 2018). For instance, Yin (2018) distinguishes exploratory, from descriptive and explanatory case studies depending on the nature of the research questions. Arguably, various scholars suggest that researchers tend to conduct all three kinds of case studies with a predominance of one of the approaches. Exploratory case studies are likely to be associated with experiments, tests, or surveys, while descriptive investigations respond to the 'what' type of questions. Descriptive case studies tend to respond to the 'how much', 'to what extent' or 'how many' type of questions. Such an approach characterises the phenomenon under research. Explanatory case studies deal with 'how' and 'why' questions and aim to understand the rationales, complexities and implications involved in a specific phenomenon instead of keeping the analysis on mere descriptions or characterisations. In my research, an explanatory perspective prevailed, although it is possible to observe a descriptive approach as well. The research questions aimed to understand how the school's reflexive practice model (RPM) operates within the boundaries of the institutional ecosystem and even beyond. They also were designed to learn how teachers, through the model, develop their reflexive practices concerning ICT and how both procedures affect their agency.

On the other hand, Bryman (2012) and Yin (2009) distinguish between the critical, extreme or unique, revelatory, representative or typical, and longitudinal case study. The critical case study draws on a well-developed theory. The case illustrates and allows the researcher to better understand its application in the

real world. The extreme or unique case study research represents unusual characteristics that have not been observed in other settings when the research is being carried out or in the researcher's or participants' specific contexts. Bryman (2012) prefers to label the representative case as an exemplary case. He defines it as cases that "epitomize a broader category of cases or they will provide a suitable context for certain research questions to be answered" (p. 71). Yin (2009) defines the revelatory case as a recently available phenomenon and previously unreachable to investigators. Bryman (2012) and Yin (2009) understand the longitudinal case study as cases that can be investigated within two or more stages.

Again, as suggested by the authors in the previous classification, a qualitative researcher can stand in-between categories. In other words, a case study can gain more than one of these labels. My thesis constitutes a critical case study because it draws on the theoretical development of reflexive practice (RP) and user-generated contexts (UGCs), and the cases examined within the selected school ecosystem represent the theory application in practice. It also illustrates a unique situation regarding teachers' ICT reflexive practices in Chile and other locations. Therefore, the thesis could be labelled as a unique case study research.

As said, a case study approach is appropriate for my thesis because the uniqueness of the research context responds to the challenges associated with teachers' ICT reflexive practices and CPD I have drawn in the literature review. Several authors highlight the importance of developing conscious ICT teaching practices (Albion & Tondeur, 2018; Cornelius & Shanks, 2017; Philipsen et al., 2019; Tondeur et al., 2007). A large body of research claims the need to develop consistent CPD that fortifies teachers' agency regarding their ICT uses in teaching (Albion & Tondeur, 2018; Bond et al., 2019; Bond, 2020; Philipsen et al., 2019). Although not utilizing the term 'reflexion' explicitly, recent literature

highlights the relevance of exploring how teachers think about their ICT practices in the spirit of refinement (Albion & Tondeur, 2018; Michos et al., 2018; Schildkamp et al., 2020). In this sense, academy and schools need to continuously work together to bridge the existing gap between theory and practice (Bano et al., 2018; Cook et al., 2019; John & Sutherland, 2006; Loveless & Williamson, 2013).

Besides, the research site becomes an illustration of the theory of reflexion combined with UGCs to refine teachers' ICT practices. In this way, the school provides evidence to support the theory, but in reference to ICT (Tight, 2017; Yin, 2018). The institution chosen for this thesis has developed a specific reflexive practice model (RPM) representing how six teacher participants make the most of ICT by generating unique contexts suitable for them and their learners' needs. The literature has shown that applications and explorations of reflexive practice to the uses of ICT in teaching have been sparse (Michos et al., 2018). Therefore, the research context becomes an illustrative situation associated with the current research problem (Burgess et al., 2006; Yin, 2018).

This section is structured as follows: first, I explain the sampling and data collection methods; then, I discuss the ethical protocol.

1. Selection of cases

There are many approaches I could have taken to recruit participating teachers. However, the theoretical background of the thesis (i.e., reflexive practice and UGCs) allowed me to design a specific way of approaching sampling. On the other hand, different scholars such as Koerber & McMichael (2008) or Creswell (2013) point out the lack of representativeness associated with qualitative design. However, the same authors argue that there are contradictory viewpoints on this issue. They highlight that academic experts in qualitative research defend the

significance of prioritizing the richness and depth of a phenomenon that has been marginally explored over generalizability, which is more suitable for quantitative research (Ely, 2003; Guba & Lincoln, 1994).

The uniqueness of this institution's RPM enabled me to investigate the combined potentials of reflexion, ICT teaching practices, UGCs, and teachers' agency as a particularly formal way of CPD. These four areas have been somewhat explored together and marginally treated in the practical applications of technology in education. Tondeur et al. (2021) argue that it is pivotal to conduct an in-depth assessment of existing models that intend to bridge theory and practice in teaching with ICT. I sustain that it is also essential to carry out profound investigations of educational institutions that intend to bridge the gap between policy and practice regarding teachers' ICT practices. The situation of this school appears to be one research opportunity that responds to such claims.

Regarding the sample size, it is vital to note that teachers and school policymakers were crucial to provide rich data in this research. Considering that reflexion deals with aspects of teaching that go beyond the boundaries of a given learning experience, exploring the visions and expectations of school authorities (i.e., the heads of departments) is likewise vital to factor (Bleakly, 1999; Biesta et al., 2015; Freire & Shor, 2014; Gore & Zeichner, 1911; Smyth, 1992; Sparks Langer et al., 1991).

Drawing on the three reflexive dimensions I discussed in the literature review (i.e., professional, departmental, and institutional), I used purposive sampling to select the school and the teachers (Bryman, 2012; Mullet, 2018). I conducted this non-probability method to sample cases relevant to the thesis' research questions and goals. Bryman (2012) argues that purposive sampling:

...is essentially to do with the selection of units (which may be people, organisations, documents, departments, and so on), with direct reference to the research questions being asked. The idea is that the research questions should give an indication of what units need to be sampled (p. 416).

I defined three sampling levels based on three different criteria to select the cases (Bryman, 2016): a) that the school develops a reflexive practice CPD programme that encourages teachers to consider the school ecosystem in their decisions; b) that the reflexive practice model focuses on the practical uses of ICT; therefore, c) that the cases use ICT in practice, reflect about their ICT uses, and consider different layers of their school ecosystem when carrying out their reflexive practices.

These criteria are aligned with purposive sampling because the research site explicitly links its way of operating to the focus of the thesis. The school selected has developed clear policies towards encouraging reflexion and ICT practices.

I carried out a fixed purposive sampling strategy (Bryman, 2012). I established the sample before data collection, and there were no additional cases to the original sample as the research proceeded. However, some level of iteration was developed within one case (i.e., case no.6). In other words, once data collection concluded, I asked that specific case if I could observe one additional class because it could enrich data analysis. Therefore, it is possible to suggest that a sort of theoretical sampling was also conducted. I used the theory of reflexive practice to guide my decision to keep case no.6's class observation or include a new one to gain richer data regarding my thesis' purpose (Bryman, 2012). It is essential to recognise at this point how the theory of reflexive practice applies to my role as a researcher. Notably, my own reflexive capacity and agency played

a pivotal role in making choices that would lead to richer outcomes considering the research aims and questions.

The sample was composed of six schoolteachers from different subject areas of the school curricula (i.e., History, Geography & Social Studies, Physics, and Technology, Innovation & Projects), and three school policymakers in charge of encouraging reflexive practices among the staff (i.e., each teacher's head of department). The teachers use ICT in their practices regularly and participate in weekly reflexive practice meetings. As will I explain in the next section, I conducted one ICT class observation, except for case no. 6 because I observed two sessions. Also, I observed one reflexive practice meeting per case, and I interviewed each participant's head of department (HoD). It is important to note that cases 3, 4 & 5 worked in the same department. The same situation was experienced by cases 2 & 6. Therefore, although I observed six cases, only three HoDs were interviewed (i.e., History, Geography & Social Sciences, Sciences, and Technology).

Concerning sample size, it is crucial to highlight the richness of the data provided by these six cases. Although the sample is relatively small, it was crucial to investigate one institution to provide a sense of the development of teachers' ICT reflexive practices within a single school ecosystem. Additionally, I sought teacher participants from different subject domains to explore patterns and differences across cases and assess how teacher agency was carried out within the same ecosystem.

Regarding the methodological approach, the fact that reflexion and UGCs deal with teachers' agency made me choose a qualitative study over quantitative research. Surveying a large population may offer general information about teachers' perceptions and beliefs regarding their ICT uses in practice (Ertmer, 2005; Ertmer & Ottenbreit-Lefwitch, 2010; Ertmer et al., 2012; Tondeur et al.,

2017). On the other hand, qualitative methods are likely to allow the researcher to carry out a more profound analysis of teachers' thinking, decisions, and actions regarding their ICT practices.

I have provided a general overview of the reasons to select a sample size appropriate to the study and the methods that I conducted to reach the teacher participants and school policymakers. In the next section, I will explain the school's reflexive practice model (RPM) and offer an overview of each case to contextualise the reader.

a. The School's RPM

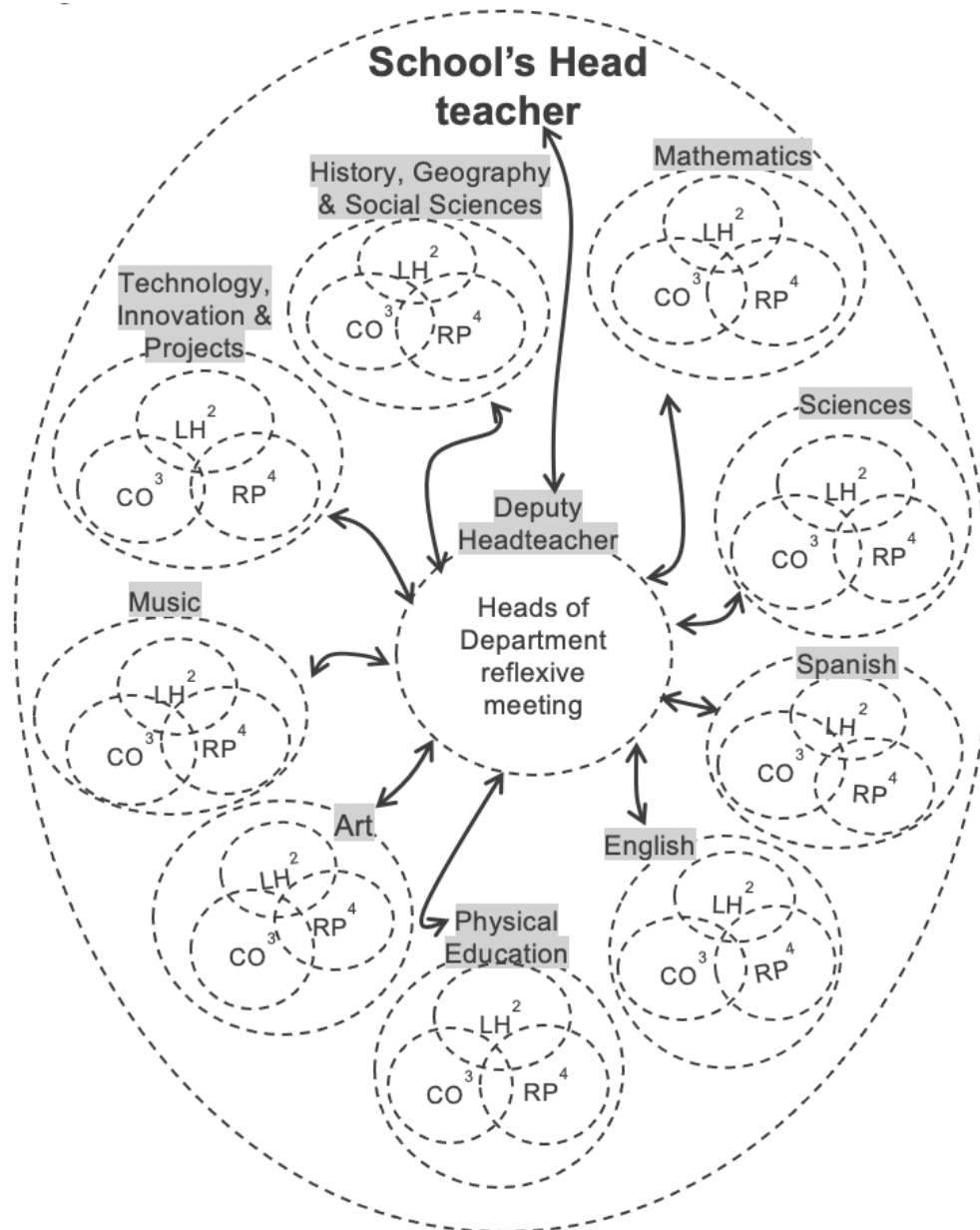
The model's primary focus is to bridge policy and practice, and theory and practice. Disseminating information across the different reflexive dimensions (i.e., professional, departmental, and institutional), is key to fortifying teachers' decision-making processes regarding their ICT practices and increasing agency.

Figure 9 shows how the school's RPM is operationalised within the three reflexive dimensions, namely professional, departmental, and institutional. The teacher is provided with a 1-weekly level hour to design the lesson plan jointly with colleagues of the same grade or level they teach (e.g., 7th grade; see 'LH' in figure 9). The teacher applies the design in the classroom with his/her students; the HoD observes such implementations at least once a month (see 'CO' in figure 9). Teachers and the HoD meet once a week to discuss the implications of the ICT practice and make new decisions regarding further learning and teaching experiences (see 'RP' in figure 9). All these activities constitute an integral part of the school's daily life, interplay and iterate. The HoDs share an extended reflexive practice meeting with the Deputy Headteacher once a week. There is a bidirectional dynamic of sharing information in these opportunities: the HoDs notify what is happening in practice, while the Deputy Headteacher informs what has been discussed at the institutional level. Both the HoD and the Deputy

Headteacher act as bridges that share information from the baseline to the top and conversely (see the bidirectional arrows in figure 9).

The relationship among this school ecosystem's staff is multidirectional. Each department is aware of their colleagues' practices because the HoDs disseminate the information they need to share from their extended meetings. The Deputy Headteacher learns from the practice because the HoD informs what he/she observes in class and discusses with his/her team in the reflexive practice meetings. Each teacher is aware of the school's norms, regulations, and expectations regarding how to develop their ICT practices because the HoD constantly informs and discusses the policies generated at the institutional dimension. In this way, each professional has his/her own duties and degrees of agency to make responsible decisions. In other words, nobody makes arbitrary choices. Everything must be decided according to the school's ecosystem specificities.

Figure 9. Characterisation of the School's RPM²¹



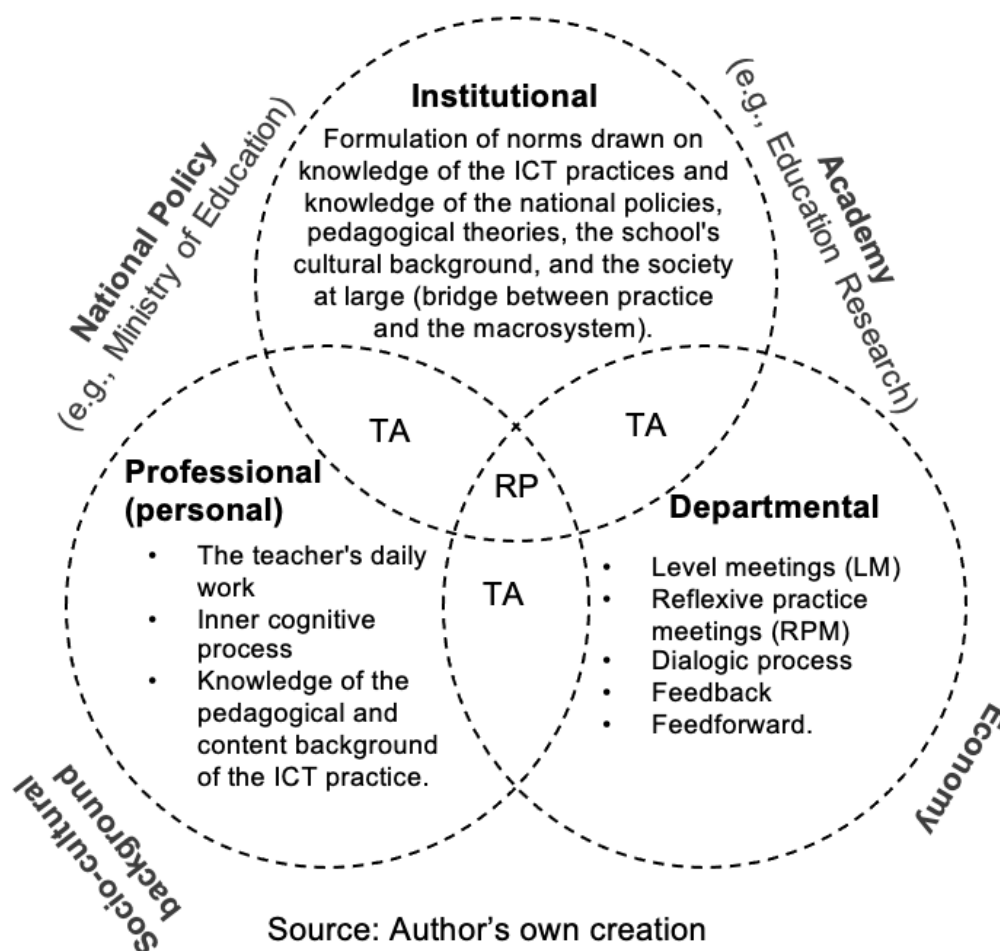
Source: Author's own creation

²¹ Note:

1. The bigger ellipse represents the entire school ecosystem.
2. CO = Class observation by the HoD.
3. LH = Level hour to make the ICT teaching design.
4. RP = Reflexive practice meeting.

On the other hand, I observed that the school ecosystem established linkages with the larger macrosystem permanently. Teachers drew their decisions on valuable information coming from the macrosystem (see 'national policy', 'academy', 'sociocultural background', and 'economy' in figure 10). For instance, institutional policymakers and teacher participants consider two pedagogical socio-constructivist frameworks to support their ICT practices: Teaching for Understanding (TfU) and Project-Based Learning (PBL), revealing additional features beyond the institutional boundaries.

Figure 10. Characterisation of the School's Ecosystem²²



²² TA = teacher agency

RP = Reflexive practice

Figure 10 also shows the interplay between the three dimensions and how reflexion is being developed in each of them. A result of such an interplay is precisely teacher agency (see 'TA' in the figure) according to each professional's role within the ecosystem (e.g., teacher participants and HoDs, among others). The primary outcome is a reflexive practice model (RPM) that operates within complex relational systems among staff and beyond.

Now that I have contextualised how this school's RPM operates, the following section briefly describes the pedagogical frameworks underlying teachers' ICT practices.

b. Pedagogical backgrounds to the participants' ICT practices

i. The Teaching for Understanding (TfU) and Project-based Learning (PBL) frameworks to support teachers' ICT practices

It is vital to briefly review the two pedagogical frameworks underlying the teacher participants' ICT practices to allow the reader to better understand the findings later in this thesis. Although there is a wide range of theories in dialogue with educational technology, I chose social constructivism and constructionism because the frameworks used by this school highly draw on these theories. There is also a personal philosophical rationale for this choice. I believe that learning and teaching entail social actions, that knowledge is dynamic and keeps evolving with human development. Therefore, learning is not passive or static. Learners and teachers can increase and create new knowledge over time, and they do it socially (Freire, 2014).

As explicit institutional policies, all the cases drew their practices on Harvard's TfU. Additionally, two cases (i.e., C2 & C6) implemented a PBL framework for the first time to subsidise other subject areas of the core school curricula. The practitioners have been participating from 2018 onwards in professional

development programmes associated with PBL. In this way, TfU and PBL supported teachers' ICT practices. The following passages will briefly explain each framework and its relationship to ICT.

TfU primarily draws on Social Constructivism and sees the practice to promote a deep understanding of processes, concepts, and systems. Also, the framework aims to encourage the learner's ability to generate new knowledge regarding a specific field and apply it in real-world contexts. David Perkins is considered one of the fathers of the framework. In his view, the student demonstrates understanding through performances, which reveals different degrees of comprehension. Understanding is unveiled when the learner performs different actions, such as defining, describing, explaining, or analogising, among many others (Perkins, 1993). In summary, TfU sees understanding as:

...a matter of being able to carry out a variety of 'performances' concerning the topic -- performances like making predictions about the snowball fight in space that show one's understanding and, at the same time, advance it by encompassing new situations. We call such performances 'understanding performances' or 'performances of understanding' (Perkins, 1993, p. 33).

According to TfU, to increase learners' deep understanding, the teacher must follow a set of principles, such as (Perkins, 1993; Perkins & Blythe, 1998):

- Transitioning from teacher to student-centred and even a thinking-centred approach. In other words, the teacher should place the focus of the practice on the learner as an active participant and the owner of his or her learning process. In addition, the professional must encourage students to make their thinking visible through a different skill development such as critical thinking, creativity and metacognition (Stone Wiske et al., 2013). This idea presupposes a greater commitment of pupils in the learning process. The

teacher orchestrates the learning experience, so they understand a given field or discipline for a sustained period. For instance, the content of Physics, is not just a matter of one year. It is a matter of life experience.

- Understanding assessment as an ongoing process, in which the student can reflect about his or her performances in multiple ways. In so doing, the learner explores his or her preconceptions (and adjust potential misconceptions), through self-evaluation, peer-to-peer assessment, extrinsic feedback (i.e., from the teacher or peers), and/or intrinsic feedback or metacognition (i.e., also labelled as learning about learning). According to the framework, assessment constitutes the core component of learning and teaching. Assessment pursues deep conceptual change. In this sense, the student is not a passive entity who absorbs knowledge: he or she is rather a learning agent. Considering learning as a social process, multiple modes of assessment provide the student with the support of peers and teachers needed to keep generating knowledge over time (Nickerson, 2012).

The role of ICT in TfU is essential to learning (Stone Wiske et al., 2013). If used consciously, they can facilitate multiple forms of assessment, such as individual questionnaires to foster metacognition, the use of a forum or a chat to develop peer-to-peer assessment, among other activities. Moreover, by mediating the teacher-student and student-student interactions, ICT can constitute rich opportunities to increase learning gains (Coll et al., 2007).

- Supporting learning with multiple modes of representation, namely visual, written, audio-visual, among others. In this point, ICT plays a pivotal role because the concept entails the massification of different modes from written texts, still and moving images, audios, mute videos, and audio videos, among others (Goldenberg, 1997).

- Knowing the stages of human development. For instance, mathematical abstraction cannot be fully encouraged in children younger than eight years old (Perkins, 1993).
- Teaching not only the content associated with the discipline but most importantly the ways in which the discipline is being performed. In this sense, History is not only a matter of learning facts but a process in which the student inquires, analyses, interprets, synthesises, makes judgements, by generating different products such as an essay or a report. The teacher plays a key role as the 'zone of proximal development' or that of scaffolding the learner's needs, puzzles, or misconceptions (Vygotsky, 1978).
- Encouraging students to apply the acquired and/or generated knowledge in real-life situations by motivating them to master the skills specific of the discipline they learn. From the TfU's viewpoint, ICT extends the possibilities of developing such activities, as they potentially enhance the student's capacity to master knowledge, skills, and understanding depth (Salomon et al., 1991). For instance, online word processors can help students develop critical writing skills collaboratively; lab simulations in sciences augment modes in which students can imagine a specific situation or procedure concerning the discipline, or web search engines can allow pupils to learn how to investigate information online correctly. It is important to note that the TfU framework understands ICT as a means, not an end. Therefore, ICT must promote students' performances and the learning purposes' achievement. In this sense, the role of the teacher as companion and orchestrator of the learner's experience is pivotal.

The last principle reveals similarities with PBL, which is also being used in this school. Peng et al. (2019) highlight that PBL:

...is a student-centred pedagogy that encourages students to learn by working with authentic whole-tasks or projects. It highlights the

integration of knowing and doing based on the belief that students acquire deep knowledge through active exploration of real-world problems (p. 52).

In this sense, it is possible to observe high alignment between both pedagogical frameworks (i.e., PBL and TfU). However, in this school, PBL implementation within teachers' ICT practices moved beyond some statements of TfU by fostering greater student autonomy in the learning process. In other words, the teacher participants exerted a more prominent role in the design and evaluation stages of the teaching practice (Joneau-Sion & Sánchez, 2013; Svihla, et al., 2015). Their position in supporting students was less frequent than those that drew their ICT practices exclusively on TfU.

A significant principle of PBL that had a vital influence in C2 & C6's ICT practices, is that learners need to exhibit their products (Chanpet et al., 2018). By the end of 2019, learners presented all their products at the first version of the Technology, Innovation & Projects' (TIP) fair. Finally, it is essential to mention that PBL situates between Social Constructivism (Erstad, 2002; Kokotsaki et al., 2016) and Constructionism (Svihla, 2016).

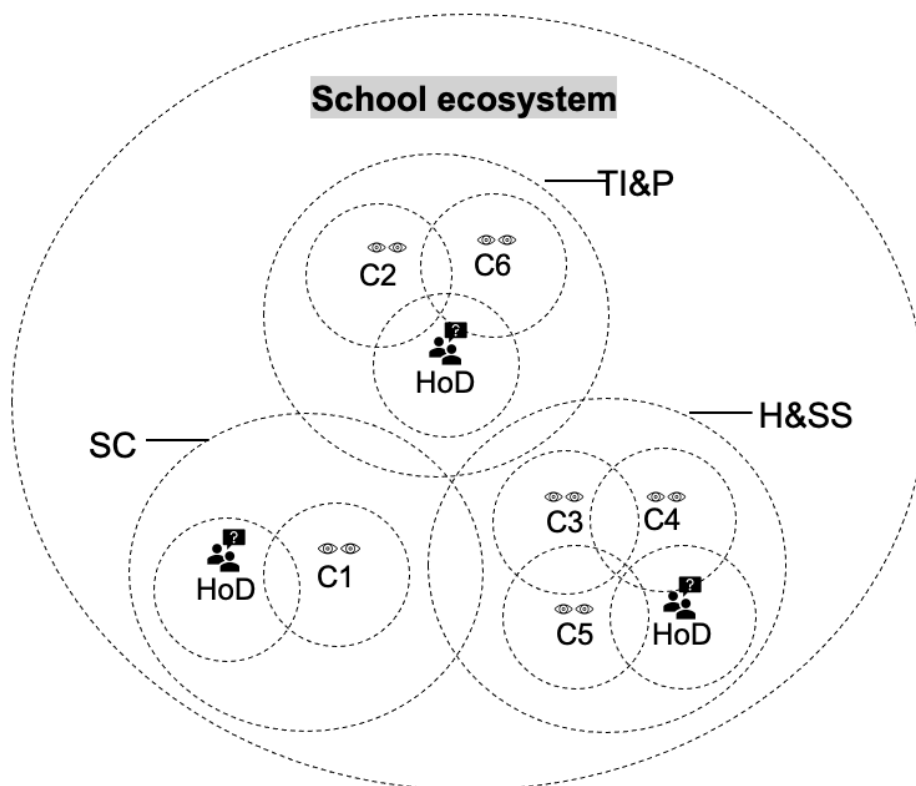
Defining the theoretical stance of the framework is problematic (Chanpet et al., 2018). Constructionism implies learners' greater self-regulation. Like TfU, PBL understands assessment as ongoing, cyclical, endless reflexive opportunities for both learners and teachers (Callaghan, 2016; Joneau-Sion & Sánchez, 2013). For this reason, the projects designed inside the TIP department lasted the entire academic year (i.e., from March to December) and were divided into different stages. In summary, PBL aims at fostering collaborative learning, critical thinking, greater pupil's autonomy and self-regulation, metacognition and creative problem solving (Callaghan, 2016; Remijan, 2016; Svihla et al., 2015; Svihla, 2016).

c. The participants' ICT practices' overview


Table 1. Cases Overview


Department/ Subject	Level	ICT	Learning purpose	Framework	
C1					
Sciences	Physics	Key Stage 4/ 8 th grade	PowerPoint Presentation	To understand the concept of mechanical work.	TfU
C3, C4 & C5					
History, Geography & Social Sciences	History	Key Stage 2, Year 3/ 2 nd grade	YouTube Videos	To identify the characteristics of Chileans' indigenous people	TfU
C2 & C6					
Technology Innovation & Projects	Programming Workshop	Key Stage 4/ 8 th grade	Platform Open Roberta & Arduino	- To identify the parts and functions of a robot. - To understand how Open Roberta operates.	TfU & PBL
C2 & C6					
Technology, Innovation & Projects	Technology	Key Stage 4 th / 8 th grade	Photoshop & Google Drive	- To design a photo exhibition about the learners' journey throughout secondary school.	TfU & PBL

Figure 11. Cases and methods of data collection



Note:

 = Class and reflexive practice meeting observations.

 = Interviews.

TI&P = Technology, Innovation & Projects Department.

SC = Sciences Department.

H&SS = History & Social Sciences Department.

Source: Author's own creation.

This section provides an overview of the teacher participants' ICT reflexive practices. Table 1 characterises each case by naming their subject area and department, the group of students with which each teacher participant worked, the ICT chosen by the professionals, the learning purpose associated with the practice, and the framework supporting their ICT practices. In what follows, I describe each of these aspects.

Firstly, C1 is a Physics teacher who used a PowerPoint presentation to explain the concept of 'mechanical work'. He guided a Q&A strategy to engage students with the content and the PowerPoint slide. The slide contained images that simulated everyday situations and connected them to the content being discussed. Before moving forward, it is important to note that C1 constituted the pilot phase. It is also important to note that this department was composed only of two teachers, C1 and his HoD, also C2. This issue meant them to have too many class hours. Although they had two hours per week to design and hold their reflexive practice meetings, the workload was considerable because they had to teach Physics from 7th to 12th grade (i.e., Key Stage 3 to Key Stage 5). C1 had five years of teaching experience and five years of experience with the TfU. The HoD described him as a professional who is "[...] very open to all sorts of changes. He adapts easily. It's difficult to see that he says 'no' to any kind of innovation. The little things that I have heard from him about innovations has primarily been associated with lack of time" (C1's HoD interview).

Secondly, C3, C4 & C5 worked in the History, Geography & Social Studies department with students of the same age (i.e., 7-8 years old, equivalent to Key stage 2). They made the lesson plan together, chose the same ICT resource (i.e., videos), and agreed with the HoD on how the technology chosen should be used: displaying and stopping three videos in specific moments preferred by each teacher to discuss the content²³ with the students further by using a Q&A strategy. Despite these similarities, each teacher emphasised different features while using the videos. After each video, they planned to ensure that students understood the content by applying a metacognitive strategy. The teachers did not pre-define the strategy in the lesson plan; therefore, the class closure was

²³ The content was related to three indigenous cultures lifestyles: a) Aymará; b) Mapuche; and c) Selk'nam.

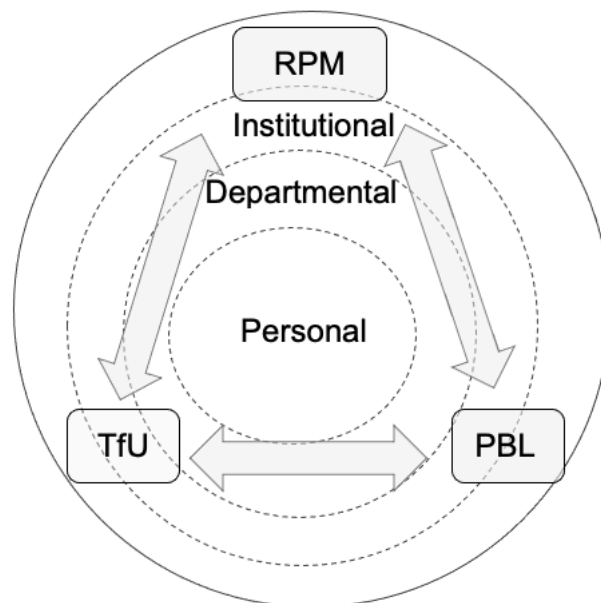
different in each case. The teachers drew their ICT practice exclusively on TfU. It was interesting to observe that these teachers had different years of experience as in-service teachers in implementing the TfU and ICT. Therefore, their openness to pedagogic innovation differed substantially. C5 was the most experienced teacher in this school. She did not have the most years of experience as a teacher but was the most familiarised with the TfU. C3 had the most years of experience but was working in the school for only two years. 2019 was the first year of teaching experience for C4. Therefore, it was also her first year using ICT with pupils and implementing the TfU. These issues marked differences in the decisions adopted by each teacher, which can be seen in more depth in appendix 12.

Concerning C2 & C6, they worked in the Technology, Innovation & Projects (TIP) department and guided two courses (i.e., Technology for C6 and a Programming Workshop for C2). Both cases worked with 8th grade students. The projects consisted of a Photo exhibition using Photoshop (C6) and the construction of an Arduino robot (i.e., a traffic light and a bracelet for blind people; C2). To produce each project, students were organised in pairs or teams of three members. The same group worked together throughout the whole year. Each team working either in the photo or the programming exhibition developed assessment stages (i.e., following PBL and TfU's idea of ongoing assessment). Therefore, students, always organised in the same teams, had opportunities to stop, think about their progress and foresee how to continue. This situation is consistent with some scholars' claims that PBL focuses to a greater extent on the process than on the result or the product (Remijan, 2016; Svihla, 2016; Svihla et al., 2015). C2 had approximately fifteen years of experience as a teacher and more than ten years of experience in the TfU. He was also the HoD of the Department of Sciences. C6 has worked in this school for fifteen years but has recently been involved as a teacher. He studied to become a teacher and has been exerting his new profession for two years. Beforehand, he worked in the IT department, offering

teachers technical support. Both teachers demonstrated a high degree of openness to pedagogic innovation, the PBL and TfU frameworks, as the reader will observe in the findings chapter. It is important to recall the number of teaching hours C2 had as the HoD of the Department of Science (or C1's HoD). In his view, the lack of time and the demands to comply with the curricular requirements constrain his ability to develop more innovative ICT teaching practices in the Physics subject area (which belongs to the Sciences Department), like those he conducted in the Department of Technology, Innovation & Projects. In his own words: "With my work as HoD, which has lots, lots of things to do, I have become again that sort of teacher who passes the content, although the TfU framework does not permit you to be entirely like that. But I've seen that the most important concern for me right now is to comply with the national curriculum" (C1's HoD interview).

In generic terms, the data shows that each case considered different features relevant for their ICT practices according to their learning and teaching contexts' specificities. This finding reveals that teachers developed reflexive activities while teaching with ICT to increase learning possibilities (Dewey, 1910; Diga & May, 2016; Dourish, 2004; Freire & Nogueira, 1989; Freire, 2005; Luckin, 2018; Seipold & Pachler, 2011; Seipold et al., 2014). These features, intertwined, produced unique learning and teaching contexts with ICT that were impossible to replicate faithfully to other learning and teaching practices.

Figure 12. RP, PBL & TfU interrelationship



Note:

1. RPM = Reflexive Practice Model.
2. TfU = Teaching for Understanding.
3. PBL = Project-Based Learning.

Source: author's own creation

Figure 12 shows such an interrelationship. The central circle (i.e., personal) represents the teacher's individual dimension of his/her ICT practice (involving his/her subject domain and pedagogical expertise); the circle located between the central and the peripheral ring (i.e., departmental) illustrates the ICT practice's collaborative aspect (i.e., working with colleagues and the HoD); ultimately, the broader circle shows the institutional dimension. TfU, RPM, and PBL frameworks permeate across each dimension of the teacher participants' ICT practices supporting the ICT usage in multiple ways and directions.

I have said before that there are many ways I could have written this thesis. For the purposes of this doctoral programme, I chose to privilege the richness and

depth that C2 & C6 could provide. As the reader will see in the findings chapter, these cases were the most illustrative examples of how the teacher participants, while carrying out their ICT reflexive practices, generate exclusive contexts from them and their learners. Despite my decision to narrow the cases, the reader will find data regarding the research questions and the rest of the cases in appendix 12. In the latter part of my thesis, I will delve deeper into this matter. Given a doctoral thesis' expectations, I highlight this idea in this section to justify my methodological choices.

2. Data collection methods

Drawing on the reflexive practice theory (Dewey, 1910, 1914, 1922, 1938 & 1980; Freire, 2005, 2011 & 2014), data collection moved from specific teaching situations with ICT (i.e., each case) to broader reflexive layers (i.e., patterns and differences among cases and interviews with the HoDs). To gain an in-depth understanding of how teachers think about their ICT practices while considering the different features of their school ecosystem, I conducted the three research methods that were associated with three institutional layers.

This decision was also drawn on safeguarding the trustworthiness of qualitative research. There is an extensive discussion concerning trustworthiness and validation regarding qualitative traditions. Nevertheless, as Creswell (2013) suggests, applying quantitative principles to qualitative research is problematic. In his view, alongside other authors (Bogdan & Biklen, 2006; Ely, 2003; Guba & Lincoln, 1994; Grbich, 2013), qualitative designs differ substantially in terms of purposes, assumptions, techniques, and strategies. In my case, reflexivity placed a critical role both as a subject of research and as a self-evaluation method. Qualitative research is an iterative process in which the researcher must permanently subject him/herself to critical self-assessment (Grbich, 2013). For instance, recognising my philosophical stance between Social Constructivism

and Constructionism was critical to understand the relevance I gave to the broader ecosystem in developing teachers' reflexive practice or to the focus of ICT practices on the generation of contexts towards the learner-centred approach. On the other hand, I have mentioned earlier that there is a theoretical rationale to select methods. In addition to such a justification, I followed Creswell's (2013) suggestion to use multiple sources and methods to verify evidence:

1. Class observations: I developed one class observation per case. Each of these is associated with the personal reflexion that takes place within the school ecosystem. Individually, each case made decisions according to the specificities of their teaching contexts, which guided their choices. The observations focused on the alternatives selected by the practitioners regarding how they used ICT in practice. I decided to conduct class observations based on the idea that learning and teaching are situated and context-specific (Beazley et al., 2008; Stockless, 2018; Warwick, 2020). In this way, the class observations focused on the teachers' responsiveness to different issues that may challenge the ICT integration (e.g., the ICT did not function as expected, the teacher did not anticipate possible reactions of the students while using ICT, a particular contingency did not allow the teacher to implement the use as designed in the lesson plan, among others).
2. Reflexive practice meetings' observations: I accompanied each teacher to a reflexive practice meeting held with colleagues and their HoDs. I focused on how the teacher participants collaborated with colleagues and school authorities in assessing their ICT teaching practices. Drawing on the idea that reflexion constitutes a social praxis (Dewey, 1914, 1922, 1960; Freire, 2011, 2014; Freire & Nogueira, 1989), it was essential to explore how the teacher integrated his or her personal reflexions with a broader domain of the practice, that is, the departmental layer. Considering that this school

offers a one-hour weekly reflexive practice meeting, observing these sessions was crucial to understanding their ICT reflexive practices in a holistic way.

3. As a third layer, I interviewed the participants' HoDs. Considering that reflexive teaching deals with the practitioners' recounts of the practice according to the broader ecosystem (i.e., the institution under research; Bleakly, 1999; Freire, 2014), it was essential to compare and contrast the view of the HoDs against the data collected by the observations. In this institution, the HoDs observe the teachers' classes and provide feedback during the reflexive practice meetings. Hence, their viewpoint about the progress of the practice is likewise relevant. Moreover, following the idea that reflexion implies moving beyond the physical boundaries of the classroom (Freire & Shor, 2014), the interviews constitute a more extensive dimension from which the practitioners think, discuss, and re-design their ICT uses over time.

These methods were also conceived as different UGCs, as the participants thought about their practices, how they were carried out, their implications and actions that could be improved. I conducted direct observations (Yin, 2018) and created an observational protocol (Bogdan & Biklen, 2006) to explore and understand how teachers developed their ICT reflexive practices²⁴. Also, I combined direct observations with semi-structured interviews. Yin (2018) recommends using more than a single source of evidence for case studies. Besides, one method may offer a partial view of how teachers practise reflexion concerning their ICT practices. Therefore, interviews allowed me to explore how the school's reflexive practice model behaved according to the theory (Dewey, 1910, Freire, 1998; Freire, 2014; Freire & Shor, 2014). Interviews were semi-structured because I was interested in providing the informant with sufficient

²⁴ The observation protocol is presented in appendix 10.

flexibility to express his/her voice regarding how the department combined reflexive practices and ICT. In this sense, structured interviews would have been too rigid, whereas unstructured interviews could have misled me from the research focus and questions (Bogdan & Biklen, 2006). I developed an initial interview guide and modified the questions in situ according to the informants' answers and the research focus²⁵.

I generated the instruments from the main concepts identified in the seminal literature regarding reflexion, ICT and CPD. Then, I decided to use case 1 as the pilot phase to test out the interview guide and observational protocols. Yin (2018) argues that pilot cases can help the researcher to improve methodological issues, as well as the conceptual development of a study. The pilot case helped me to refine the instruments to increase flexibility and focus on issues relevant to the research questions, aims and the thesis' conceptual development. In addition, the pilot case was methodologically significant. It offered me information about the daily logistics of the fieldwork and whether the way I proceeded was suitable or not to meet the research aims and respond to the research questions (Yin, 2018). It also helped refine the areas I should consider in the observation protocols and questions for the interview guides. For instance, after the pilot case, I realised that it was necessary to ask teachers to avoid organising the observation on a day pupils had an extra-curricular activity before the session observed. Students arrived fifteen minutes late when I observed the pilot case because they participated in a ceremony that lasted longer than expected. If I could observe the 45-minutes class hour, I might have had richer data about the teacher's ICT reflexive practice (IRP). Then I would have made richer connections with the reflexive practice meeting observation and the interview. In addition, the pilot case helped to refine the observation protocol by adding possible technologies that teachers and students might use in the classroom (see

²⁵ See the interview guide in appendix 11.

appendix 10). Although these decisions seem to be merely methodological, they are also conceptual. For instance, registering the devices and resources used by the teacher participants and students was crucial to understand how they generated specific contexts while learning and teaching with ICT. Therefore, it was related to the notion of user-generated contexts (Dourish, 2004; Dourish, 2017; Luckin, et al., 2011; Luckin, 2018). Suppose a case (or a teacher) used PowerPoint and content-delivery strategies primarily characterised his or her practice. Suppose a second case (or another teacher) encouraged the use of videos to produce a documentary. I needed to register those details to easily access the data about the teacher's choices, and the kind of technology used during transcription or check information later during analysis.

Summarising what I have said so far, I explored three reflexive layers or dimensions that interact altogether:

- a) the specific teaching and learning experiences that took place inside the classroom (i.e., professional layer);
- b) the collaborative reflexion that happened in the reflexive practice meetings (i.e., departmental layer);
- c) the CPD domain reported by the conversations with the HoDs (institutional layer).

This procedure allowed me to gain a deep view of how each teacher participant thinks about his/her own ICT teaching practices embedded within the school ecosystem. The methods approach the research questions in different ways. While the three methods respond to the main research question, the reflexive practice meetings and interviews are critical to understand how reflexion moves from professional (i.e., class observations) to departmental and institutional reflexion.

Each dataset was composed of (Bogdan & Biklen, 2006; Bryman, 2012; Grbich, 2013; Yin, 2018):

- a) field notes and video records for the class and reflexive practice meetings observations;
- b) field notes and audio records for the interviews.

I decided to video-record the class and reflexive practice meetings because videos allowed me to explore implicit ways in which reflexion informs the teacher how to use ICT in practice. Reflexion is associated with making explicit, hidden principles and ideas that permeate the practice through the teachers' agency (Samaras & Fox, 2013; Schön, 1983; Silcock, 1994; Smyth, 1992). Having the reflexive opportunity to observe these dynamics after the sessions allowed me to develop richer interpretations of the data. Besides, such opportunities helped me link the notions underlying this thesis with practice to pursue theoretical growth.

Considering that interviews need to be an intimate space for self-expression, I decided to use audio records to create a comfortable climate for the participants. In this way, I encouraged the HoDs to open up and share relevant ideas for the research aims and questions (Bryman, 2012).

3. Ethics

a. Ethics approval

The UCL IOE ethics committee approved the sampling, which was carried out after authorisation. The participants were required to read an information letter and sign a consent form after that²⁶. The letter explained the details of their participation in the thesis. Also, withdrawal, requiring access to the data and asking the removal of the data provided by each case was a possibility offered to

²⁶ The full versions of the information letter and consent form are presented in appendix 7.

the participants. Video records supported class and reflexive practice meeting observations. Interviews were audio-recorded. Considering that the research focus was the teachers and not the students, each teacher participating in the research, alongside and their HoDs signed a consent form (Farrimond, 2017). To safeguard the integrity of all the persons involved in the research, I also gained consent from the school's Academic Vice-Principal (equivalent to the Deputy Headteacher) to proceed with the recordings (Farrimond, 2017; Yin, 2018)²⁷. I informed each participant that I would only use the records for the research. Likewise, I noted that I might pursue other academic activities such as presentations in seminars or conferences. Despite this situation, I informed the participants that if I do so, data will be anonymised (Farrimond, 2017).

b. Ethical considerations

The first issue is associated with transparency, acknowledgement on the part of the participants of their responsibilities and implications of their participation in the research and safeguarding their right to withdraw and request their data if they desired. As I have mentioned before, participants were provided with an information letter and a consent form, which they signed before participating in the thesis (BERA, 2018).

The second issue concerns the researcher-practitioner relationship. The participant and I need to acknowledge our potential of shaping each other's reflexive thinking. Considering that educational technology is a field of interest for institutional policymakers, some uncertainties regarding my connections with the

²⁷ It is important to note that each year (in March), the school asks parents to sign a consent form to upload their children's photos and videos on the school's website. Therefore, the Deputy Headteacher mentioned that it was not necessary to ask for consent from the parents. Besides, as I noted, the video records focused on the teachers and not the students.

school authorities may appear. In this sense, guaranteeing confidentiality and trustworthiness is a crucial factor (BERA, 2018; Farrimond, 2017).

A third issue refers to the data's security and anonymity (BERA, 2018). In addition to field notes, data was composed of video and audio records. As I mentioned earlier, permission from the participants and the Deputy Headteacher was gained to use these materials (Yin, 2018). The UCL IOE ethics approval application noted that data was stored in the IOE N-Drive for a specific period. I also informed the teachers that, although anonymised findings are being disclosed with EdD examiners and can be part of other academic activities, other school community members might acknowledge their participation in the thesis.

Summarising what I have said so far, the research design contemplated three methods of data collection (i.e., class and reflexive practice meetings observations, and interviews with the participants' HoDs). Two cases (i.e., C2 & C6) worked in the Department of Technology, Innovation & Projects. Three cases worked together in the Department of History, Geography & Social Sciences (i.e., C3, C4 & C5). C1 worked with 10th grade students (i.e., 15-16 years old) in Physics. In this way, I interviewed three HoDs: the HoD of Sciences; History, Geography & Social Sciences; and Technology, Innovation & Projects. I obtained ethics approval from both the UCL-IOE ethics committee and the participants. The next chapter discusses the analytical protocol.

Part 3. Data analysis and findings

Chapter 4. Data Analysis

I chose thematic analysis (TA) to interpret the data. Different scholars claim that TA is a process in which the researcher explores, describes, and interprets aspects of a specific phenomenon (Braun & Clarke, 2019; Boyatzis, 1998; Guest, McQueen & Namey, 2012; Maguire & Delahunt, 2017). TA is a way of recognising patterns or making sense of unrelated material. Boyatzis (1998) describes TA as a process in which the researcher encodes qualitative data through systematic inquiry of a situation, organisation, culture, group of people, or even a single person. This analytical approach is suitable for this thesis for two main reasons. First, TA allowed me to identify patterns and differences within and across the cases that belonged to an exemplary institution regarding reflexive practices associated with teachers' ICT uses. Second, given that reflexion implies understanding the practice as an activity embedded into the school ecosystem, analysing data thematically allowed me to consider the relationships between the data and other features of the institution.

Gibson & Brown (2009) claim that there is no single way of analysing qualitative data. The researcher needs a great deal of flexibility and creativity to develop as rich interpretations as possible. I developed a theory-driven analysis (Boyatzis, 1998) that relies predominantly on a deductive approach. In other words, the notion of reflexive practice, agency, ICT, and CPD illuminated the construction of a priori codes, which I compared against raw data, reviewed, refined, and reduced to a new set of codes. To do so, I conducted the following procedure:

1. First, I surveyed the seminal literature regarding the notions of reflexive practice, teacher agency, ICT and CPD. Based on the works of Bond et al. (2020) and Tondeur et al. (2017), I followed a specific procedure to explore these concepts. Firstly, I generated a list of keywords associated with RP,

teacher agency, ICT and CPD. Secondly, I examined those keywords in four databases (i.e., Scopus, Web of Science, Eric EBSCO and ProQuest Education Database). To reduce the findings, I considered articles published in Q1 & Q2 journals. I included other journals when the content was relevant to the research questions and purposes. I also reviewed books and chapters according to the significance of the content for the research. Added to the works of Dewey and Freire, I reviewed the development of 'reflexive practice' from the 1980s onwards. Considering that ICT evolves and changes rapidly, I studied the literature from the 2000s onwards to review the most recent trends regarding my research field. I applied the same procedure to CPD.

2. Using a qualitative data analysis software (i.e., NVIVO), I generated preliminary codes associated with the notion of reflexive practice, teacher agency, ICT and CPD²⁸. This stage allowed me to become familiar with the research problem and identify the gaps that the data could bridge.
3. I reviewed the codes and compared them against raw data to check their compatibility (Boyatzis, 1998). This phase helped me to become familiar with the data. For so doing, I read the data carefully and repeatedly. Each time I read the transcripts, I reduced them through code and theme development (i.e., keywords, ideas and/or patterns identified within the datasets). This stage was iterative: a) I compared, contrasted, and identified patterns within data sets; b) I reviewed themes and thought about the coherence and distinctions among them (i.e., whether each theme made sense, whether the existing data supported the theme, whether themes were independent or overlapped, and whether other themes within the data enhanced the theory). During this phase, I permanently compared the data with the theoretical codes. I moved back and forth until data saturation was reached (Gibson & Brown, 2009).

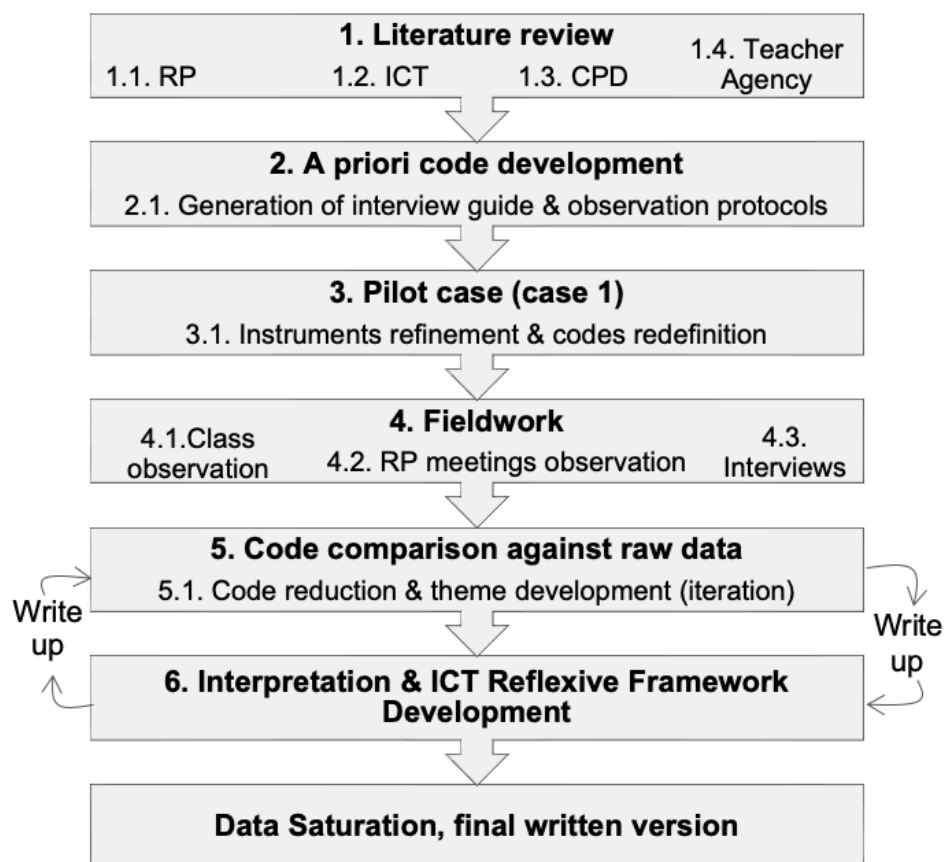
²⁸ See the codebooks in appendix 8 and 9.

4. I interpreted the codes to develop a framework of ICT reflexive practices. While interpreting the information, I constantly moved from theory to practice and from practice to theory. In other words, I used a combination of deductive and inductive approaches to generate a framework that helps researchers understand how teachers think about their ICT practices based on the ecosystemic approach. Figure 13 synthesises the overall analytical process. Figure 14 portrays the process of theme development.

I have mentioned before that several scholars highlight the need to bridge the existing gap between educational theory and the practical domain, especially regarding the uses of ICT in teaching (Philipsen et al., 2019; Rodríguez-Valls, 2014). The Reflexive ICT framework aims to reduce the gap between the theory of 'reflexive practice' and teachers' thinking concerning their ICT practices. Tondeur et al. (2021) suggests that conceptual models need to be conceived as a starting point for the marriage between theory and practice. Therefore, the 'ICT Reflexive Practice' (IRP) framework is open to be refined and developed in the future.

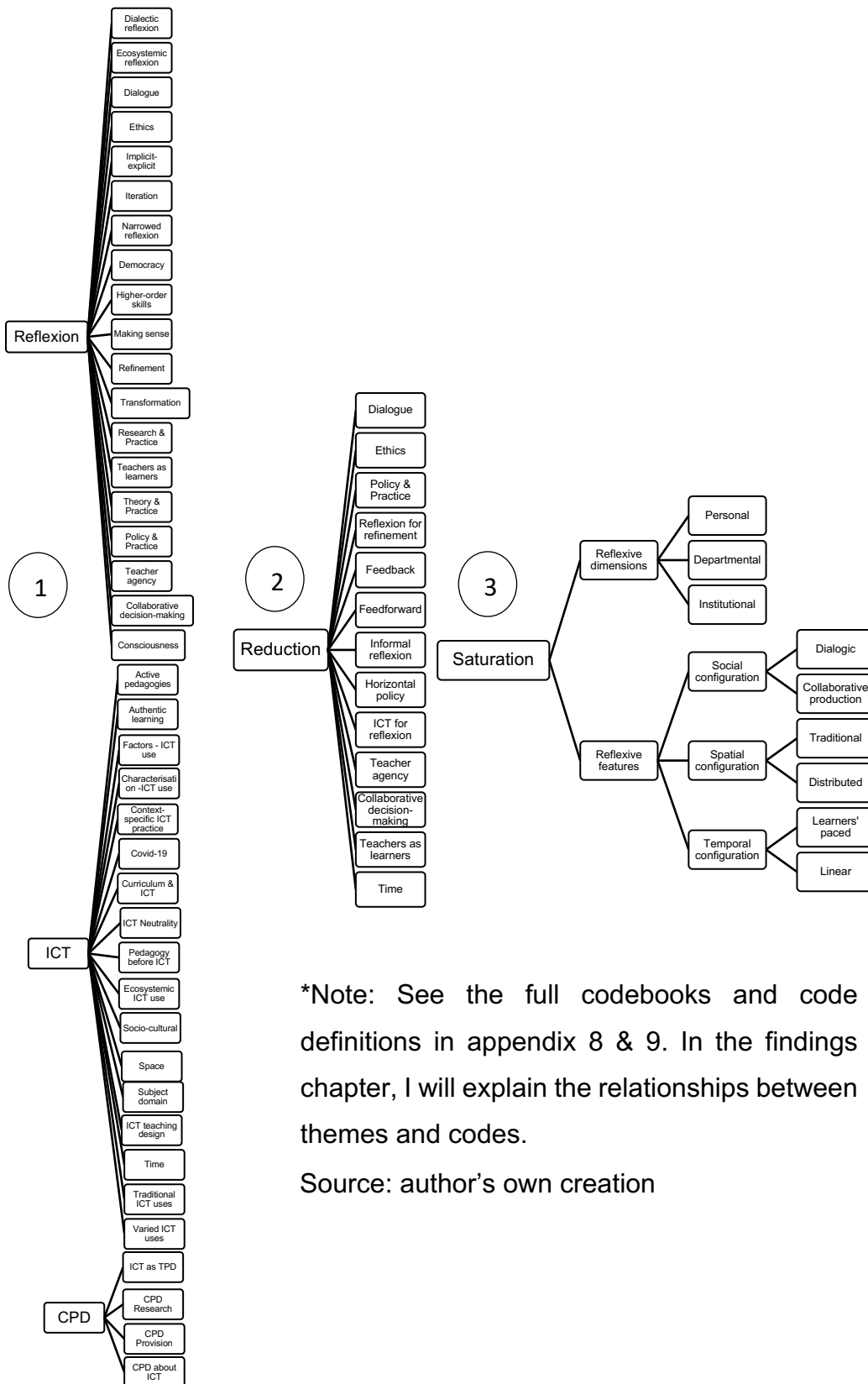
In this section, I have explained the sampling, data collection and analytical protocols. I also discussed the rationale for each of my methodological decisions. After such an explanation, I will discuss the main findings of the thesis.

Figure 13. Methods and data analysis



Source: author's own creation

Figure 14. Process of theme development*



*Note: See the full codebooks and code definitions in appendix 8 & 9. In the findings chapter, I will explain the relationships between themes and codes.

Source: author's own creation

Chapter 5. Findings

While analysing the data, I found synergies between the notion of ‘user-generated contexts’ (UGCs) and teachers’ IRPs. ‘Context’ is a complex concept and has been treated by different scholars from multiple perspectives (Dourish, 2004, Luckin, 2010; Luckin, et al., 2011; Luckin, 2018). Considering that my standpoint regarding RP highly draws on a combination of socio-constructivist and constructionist traditions, I draw from Dourish’s (2004) and Luckin’s (2018) UGC approaches to examine teacher IRPs in my own research. I recognise that there are other approaches to UGCs, such as Seipold & Pachler (2011), Seipold et al. (2014), and Pachler et al. (2010). However, although relevant for other research fields, these approaches are less apt for my research context and purposes. For instance, I see greater dialogue between Pachler and colleagues (Bachmair, 2017, Bachmair & Pachler, 2014), multimodal social semiotics and mobile learning, which is more specific than teacher professionalism in the area of educational technology.

The findings chapter reports how the data represents the synergies between the teacher participants’ IRPs and their own UGCs based on two approaches to UGCs (Dourish, 2004; Luckin, 2010, 2018; Luckin et al., 2011). In the conclusions and discussions chapter, I show my primary contribution to knowledge, that is an ICT Reflexive Practice (IRP) framework to help institutional policymakers (e.g., Headteachers, Deputy Headteacher, Heads of Departments) sustain CPD focused on refining teachers’ ICT practices over time and increasing agency.

From the six full case studies, I have selected the two that best illustrate the most compelling examples of IRPs related to UGCs. I show in this chapter four primary findings:

1. The school’s reflexive practice model (RPM) increased teachers’ agency through three interdependent and iterative dimensions: professional,

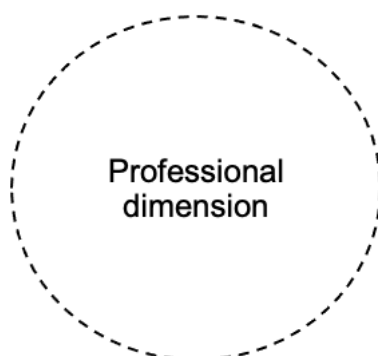
departmental, and institutional. Agency is collaborative and distributed across the school ecosystem according to the role and responsibilities assumed by each school staff member.

2. Teachers' ICT reflexive practices (IRPs) depend upon intricate reflexive processes that create unique and complex user-generated contexts suitable for the specific group of teachers and students who use ICT in a particular space, place, and time.
3. Within the institution, multiple sub-contexts interact, shaping how the community thinks of and uses ICT in practice.
4. Teachers generate hybrid and online user-generated contexts (UGCs) to develop their IRPs over time further.

1. Reflexive practice increases agency through the interplay between three dimensions

The notion of 'reflexion' implies the integration on the part of the teacher of three dimensions embedded in the school ecosystem, that is the professional, departmental and institutional dimension. The professional dimension corresponds to the teacher's own reflexion. In the professional dimension, the practitioner considers how he or she integrates the ICT practice with the specificities of his or her subject area and its pedagogical implications. The teacher discusses with colleagues and school leaders in the departmental dimension and makes collaborative decisions regarding a given ICT practice, including refinement possibilities. In the institutional dimension, the professional integrates the other dimensions with the norms, regulations, and policymakers' expectations regarding how and why teachers should carry out their ICT practices inside the school ecosystem—these three dimensions interplay, increasing teachers' agency. In what follows, I will present and discuss some examples evidenced by data of the interrelationship between these three dimensions and teachers' IRPs.

a. The professional dimension



The professional dimension was visible primarily during the classroom experience with ICT. In the class observations, the teacher participants made personal decisions in which they considered the specificities of their subject areas and the pedagogical frameworks that supported their ICT practices (see table 2).

C2 & C6 designed the activities with Arduino and the Photoshop platform. They supported the teaching design using the project-based learning (PBL) framework the school decided that the teachers of technology, innovation & projects (TIP) should develop. The PBL implied that students exhibited their projects at the TIP fair at the end of the year (i.e., November 2019). In this sense, these teachers (i.e., C2 & C6) considered the institutional dimension (i.e., the integration of the PBL with their ICT practices), the departmental dimension (i.e., the agreements they reached with colleagues and the HoD before the classroom experience) while making decisions during the session I observed. In other words, their choices moved through the three dimensions simultaneously but predominated in one of them during a specific stage.

Table 2. Evidence of the professional dimension in the data



	C2 class observation	C6 class observation
Pedagogy	<p>“When everyone remained in silence, he explained what the students should do to achieve the next task. Then, the noise of the class began to level up again. The teacher approached each pair, supervising their work. Some students also began to assist other groups”.</p>	<p>“He began supervising each team while walking throughout the room. The students worked in pairs on one computer, and the teacher approached them when they raised their hands and asked for his support”.</p>
		

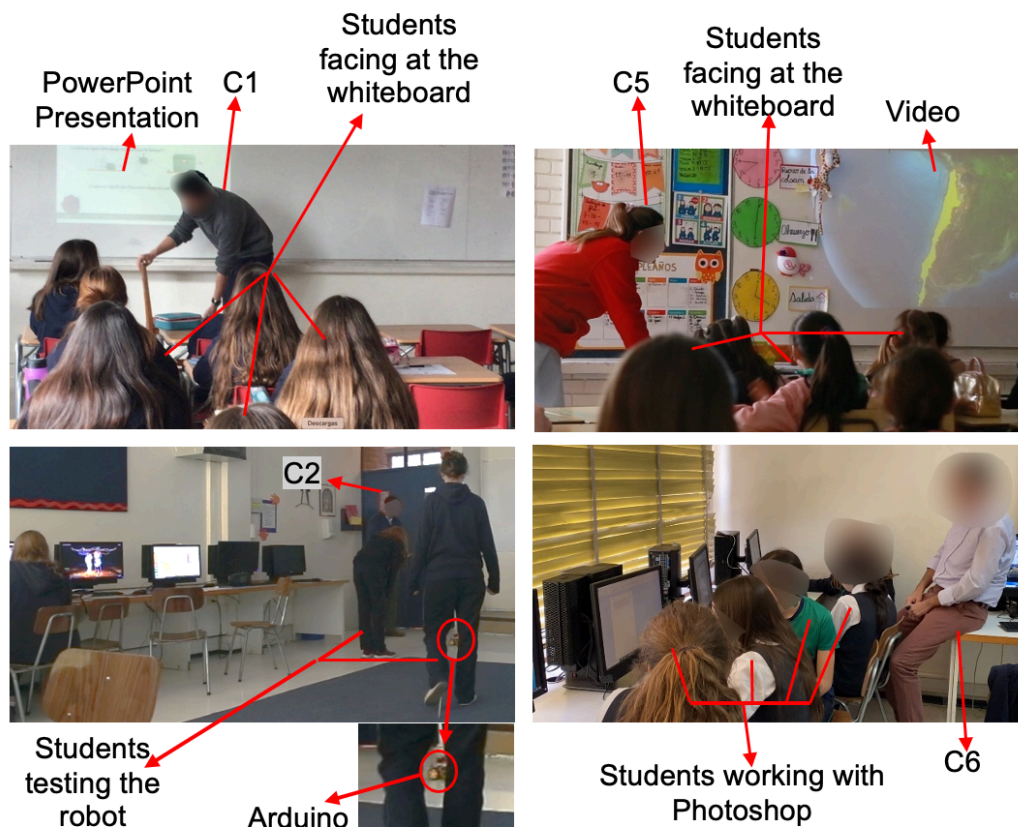
Table 2 shows two different kinds of individual decisions adopted by each case during the class observations. The first row shows each practitioner’s pedagogical decisions. Both teachers draw their ICT uses on active student participation. They let their pupils work independently and provided support when needed. This situation reveals how the institutional dimension permeates their personal decisions. The school embraces two approaches highly inspired by socio-constructivism and constructionism (i.e., PBL and TfU). Because of a particular institutional policy, these frameworks have been developed in the

school ecosystem. Therefore, although the teacher acts individually with his pupils, the dimensions are integrated and do not operate in isolation.

The second row shows choices associated with the specificities of each teacher's subject area. For instance, C6's conversations with each group of students depended on their progress. One conversation could be about reworking the image resolution (i.e., specific content associated with learning how to use the Photoshop software). Another discussion could be about storing the final version of the photo in the Google Drive folder. Another interesting issue was observed in C2. The numbers 0 and 1 were related to programming and to the physics content. The same professional taught physics to this group of students. Therefore, it was noteworthy that he constantly established connections between both subjects while working with the Arduino. He made this personal choice, although he could have chosen not to establish such a connection.

On the other hand, the teachers made personal choices concerning how the room should be organised and how students should work to achieve the learning purposes. For instance, C2 & C6 decided to set the room's furniture and ICT based on a different structure than the rest of the cases, which was more conventional, or teacher centred, as shown in Figure 15. This situation suggests that the specificities of each subject area (e.g., time, curricular requirements) influence the teacher's choices regarding the ways in which they integrate the pedagogical frameworks in their ICT practices. Although the TfU implies active student participation (Stone Wiske et al., 2013), it seems that C1, C3, C4 & C5 decided to integrate the framework partially. Consequently, their ICT implementations tended to rely on more teacher-centred pedagogies. Their ICT did not make an evident difference with respect to a blackboard. After comparing cases, I hypothesised that their agency was not as pronounced as in C2 and C6. Therefore, it is likely that ICT might not have made a profound difference in the students' learning process.

Figure 15. Difference across cases concerning the room's spatial configuration

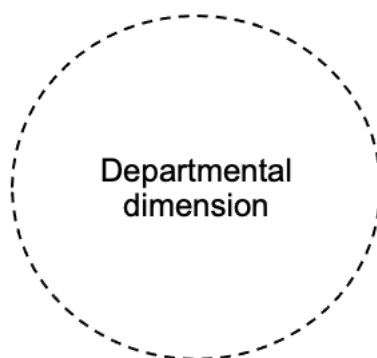


Moreover, the HoD of Technology, Innovation & Projects explained how C2 made individual decisions according to the specific learning needs of his students. When I conducted the observations and interviews, C2 implemented for the first time the Programming Workshop. Therefore, his students were introduced to content associated with programming for the first time. At the beginning of the year, the teacher observed that his students needed more time to learn those concepts in more depth. Therefore, he decided to adjust the Programming Workshop's original design. He focused the first term of the year on understanding the theory or programming concepts. Consequently, he decided to leave PBL learning aside for four months and draw his pedagogical decisions for the first term exclusively on TfU. The HoD's assessment of the decision by the

end of the year, after the exhibition of the robots at the Technology, Innovation & Projects fair, was optimistic:

“It was the only change of [C2]. Yes. And, and it was quite fun, because in depth the students worked in teams, each of them. Each team chose the object that they would like to make by using the plaque and everything else. So, the first term was devoted to the theory and the second term was based on PBL (...) The thing is that it was necessary” (C2 & C5’s HoD Interview).

b. The departmental dimension



After the class observation, the teachers held a reflexive practice meeting with the HoD in which they discussed different implications of the ICT practice. Although I could identify features of the three dimensions in the reflexive practice meeting, the most evident was the departmental dimension. In the reflexive practice meetings, teachers collaborated with colleagues and the HoD. They received feedback and offered new insights about challenging issues regarding the ICT practice. They agreed on new decisions to refine the practice in the future.

“C2: One student thought of making a bracelet with a distance sensor that notifies blind people when they approach an obstacle, such as a wall or something else. So, I tried to encourage them that, for instance,

the traffic light has the shape and appearance of an actual traffic light. But I think that we will not have enough time for that. So, we will not do it” (C2 reflexive practice meeting observation).

The quotation above shows that the teacher had something in mind based on the students' motivation. However, he was also mindful of the time left before the TIP fair, and he was conscious that they would not be able to achieve such a sophisticated task. He shared that reflexion with his HoD during the reflexive practice meeting. The teacher made the final choice and shared the justifications for such a decision with his HoD. However, he had the final voice in what was being agreed regarding this specific issue. Besides, it is interesting to note that this HoD recognises she is not an expert in all the disciplines contained in her department. She was new in the role of HoD, so she had not had experience leading groups before. She did not understand those issues as a problem. She saw them as learning opportunities, which is an intrinsic principle of reflexion:

“So, learning about programming. And it's not that you must know everything, but you need to understand something. Also, to empathise with the teacher, and to observe. I mean, just observing a class is a whole world, a completely new thing for me” (C2 & C6's HoD).

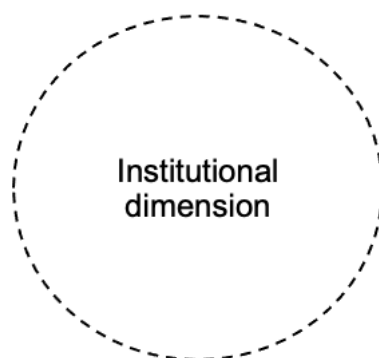
The departmental dimension extended beyond the reflexive practice meetings. Teachers also discussed the implications of their ICT practices even in passing through the hallway or sharing the coffee time. Reflexion became deeply embedded in the teachers' everyday context rather than an activity planned by the HoD. I observed this situation while waiting for C3, C4 & C5's reflexive practice meeting. I arrived a few minutes earlier and teachers were sharing coffee during the students' recess. Their conversations were precisely about the outcomes of the video use with their students. Although the HoD had not arrived

yet and the tone was more informal, decisions were reached collaboratively. This finding is also reinforced by C1's HoD, who claimed that:

“We have the ‘level hours’. In those opportunities, we design the lessons together. It also happens that, in the hallway, during recess or by chat (e.g., via WhatsApp), we resolve those details because we cannot resolve them during the level hours” (C1's HoD interview).

The previous quotation shows how each dimension can move beyond its own boundaries. Teachers make decisions regarding their ICT practices, but they are not alone, nor their choices are made arbitrarily. They must support each other among colleagues and receive the guidance of the HoD. They make the final decisions. However, they must integrate their individual choices with a broader layer composed of their colleagues and their HoDs.

c. The institutional dimension



The TIP fair exemplified how teachers moved from the professional to the institutional dimensions. In that opportunity, they shared the students' projects with the other members of the school ecosystem. They exceeded the boundaries of their department by incorporating the school's policymakers in their decisions, other subject areas, and different groups of students to whom they exhibited the products. In this sense, the data represents how the three reflexive dimensions

interplay and iterate, increasing teachers' agency moving back and forth from personal to collective dimensions. The following quote also illustrates this finding:

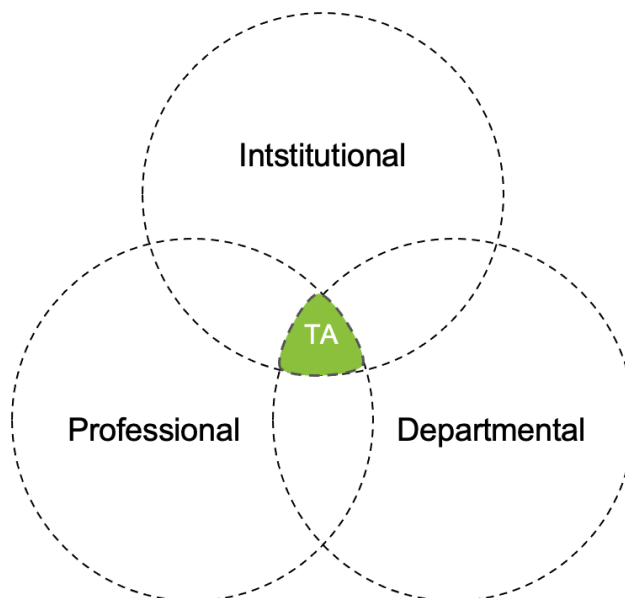
“In general, the decisions are adopted by the team, with the schedule at hand. With the minimum requirements that are sugg[ested], because, at some point, the suggestions come from the Deputy Headteacher: 'Hey, we should be more flexible with this', 'We should give more time'. If we must repeat a grade, we repeat it. And we try to cover the most content we can. And always as a team. We try to see how we solve, what we leave behind, and what we keep. But in October, we only think of the fair. Most things are somehow covered” (C2 & C6 HoD's interview).

The institutional dimension is at the same time multidimensional. It implies a broader understanding of collaboration. Collaboration moves beyond the boundaries of the department by including colleagues from different departments (i.e., transdisciplinary collaboration), other groups of students, the institutional policymakers, among others, in the decisions regarding teachers' ICT practices. That is the reason for representing each circle of each dimension with penetrable lines. Each dimension influences the other, generating virtuous cycles based on conscious, distributed, and collaborative decision-making. In what follows, I will delve deeper into this finding.

d. A reflexive model to increase teacher agency

Figure 16 represents the interplay between the three reflexive dimensions. Teacher agency is a result of such an interaction. Each dimension is portrayed by three concentric circles to show their interdependent nature. Each circle is presented with penetrable lines to symbolise how the dimensions influence each other and how reflexion implies considering the broader school ecosystem.

Figure 16. The school's reflexive dimensions



Note: TA = teacher agency

Source: author's own creation

The central point between the three dimensions is teacher agency. Drawing on the literature surveyed for this thesis and the ideas shared by the participants' HoD's, agency refers to the "Degrees of empowerment on the part of the teacher needed to adopt conscious and autonomous decisions regarding his/her pedagogical uses of ICT" (Novoa-Echaurren, 2020, p. 41). I created this definition from the testimonies of the HoDs. For instance, C3, C4 & C5's HoD illustrates this definition clearly:

"I like to empower them. You know? They own their classes, their courses. They know the dynamics of their courses better than anyone. They know how the students relate with each other. They know the rhythms. I don't know. The implicit part. They know, they handle it very well. So, they must feel with the freedom of, of using that knowledge for the final common good, which is that the students learn".

The term 'empower' is key in this quotation. The HoD understands 'power' from a horizontal perspective. This idea means that power is distributed across the school ecosystem. Decisions are taken collaboratively after agreements reached by different school staff members or what I label as different agents of the school ecosystem. Each school agent is empowered in different ways and extents according to the responsibilities his or her role has. Agency is distributed across the school, and the HoD plays a crucial role in bringing it together within the school staff. In this case, while teachers may have a more profound understanding of the classroom reality, the HoD knows better than them what is happening at the institutional level (e.g., the norms and expectations of the school's policymakers regarding the teachers' ICT practices, among others). The HoDs inform policymakers what is happening in practice, help them make informed decision-making, understand teachers' rationales for making specific choices, and feedback the reflexions and agreements reached at the institutional dimension to the teachers. Thus, each dimension is integrated, the school decisions are aligned, based on deep consciousness about the reality of the school ecosystem. The following quotations illustrate how C2 & C6's HoD act as a bridge between teachers and the Deputy Headteacher as well as among teachers of the same department:

Table 3. The HoD bringing together policy and practice

Between the department and policymakers	Between the teachers of the same department
<p>“Everything that I have told you about the extended meetings, the meeting notes, everything has been shared with her [<i>i.e., the Deputy Headteacher</i>]. I mean, ‘Do you agree?’ Don’t you agree?’ ‘I would like to address this topic’”</p> <p>“Well, from the meeting with CB the whole budget issue for next year appeared (...) this is what we will have next year, which is not bad, it is quite good. So, it means that our project will continue” (C6’s reflexive practice meeting observation).</p>	<p>“[<i>In the extended reflexive practice meeting</i>] I delivered this leaflet as a synthesis of our work during the year. I know that you are familiar with this because you coordinate the department of Science. It’s all here. This is yours [<i>she passed the leaflet to C2</i>]” (C2’s reflexive practice meeting).</p>

The second quotation in the first column of the table shows part of a conversation between C6 and his HoD. The HoD mentions that the Deputy Headteacher discussed the budget for next year. Therefore, they can start thinking about the future. This passage reveals the role of the HoD. She constantly communicates from the basis to the top and conversely. In this sense, she contributes to generating a climate of horizontal relationships between the different members of the school ecosystem.

The second column shows another particularity. The teachers of this department decided to hold additional reflexive practice meetings because they did not have as much time as teachers of other departments to share ideas altogether. This department gathered nine different teachers, and it was challenging for them to coincide. Therefore, they decided to hold an extended reflexive practice meeting once a month to share ideas, provide feedback, and make decisions collaboratively. When there was no possibility to see each other in person, the HoD also acted as a bridge between colleagues, enhancing the decision-making process, as shown in the quotation.

Teachers' ICT reflexive practices (IRPs) should result from the interplay between three dimensions (i.e., professional, departmental, and institutional, see figure 16). These dimensions integrated contribute to generating profound consciousness about the practice with ICT and incorporating the different agents involved in such a practice. In this sense, agency becomes the centrepiece of any reflexive activity. Agency is collaborative and distributed across the school ecosystem. It transcends the personal process of decision-making. While developing and accessing a lesson plan that included ICT teaching practices, the practitioners collaboratively foresee and agree on ways for further refinement (i.e., departmental reflexion). Teachers make individual decisions while implementing the teaching design, moving primarily at the professional dimension but always considering the other two dimensions of figure 16. While participating in the reflexive practice meetings, assessing the practice, and making new decisions for further implementations, teachers develop collaborative agency, moving at the departmental dimension. Teachers carry out broader projects (e.g., the TIP fair) that move beyond their departments' learning and teaching experiences. The TIP fair implied moving from the professional to the institutional dimension by considering the new PBL policy and sharing their learning products with other school community members. By integrating the three reflexive

dimensions into teachers' ICT practice, the practice is embedded into the school ecosystem's daily dynamics and ways of functioning instead of being isolated and circumscribed to a narrowed experience.

2. User-generated contexts (UGCs) to guide teacher IRPs

The concept of UGCs matters for the analysis of teachers' IRPs because, as noted, the teacher is a continuous learner of the practice, in this case, with ICT. This concept has been referred to ICT and learners. Moreover, it can be applied to the learning process of the teacher as a designer of his/her ICT practices (Luckin, 2018). In doing so, the primary notions of the thesis come together: agency, reflexivity, ICT and CPD. As I will discuss further, the cases revealed how teachers, as learners of their own ICT practices, generated different contexts embedded within the broader institutional ecosystem. Each context²⁹ showed unique situations but also patterns. Such distinctions and commonalities depended upon the cases' decision-making within a collaborative reflexive process carried out in the reflexive practice meetings and other informal reflexive situations I will detail later.

a. Teachers' UGCs from their ICT reflexive practices (IRPs)

C2 and C6 generated unique social contexts while using ICT with their pupils (Dourish, 2004, 2016 & 2017). Both teachers conceptualised distinctive ways in which their students interacted with two different computational systems (i.e., the programming platform and the Photoshop software) and interpreted the social settings associated with such use. C2 and C6, as designers of their ICT learning and teaching experiences, thought carefully about how the interactions among

²⁹ Please note that one context belonged to one class observation, or one reflexive practice meeting observation. Therefore, within one case, it was possible to observe two user-generated contexts or more.

students, the ICT resources and devices, and the learner's understandings transit within the classroom experience and across the school ecosystem. In this way, teachers' ICT practices depend upon intricate reflexive processes that create unique and complex contexts, each of which moves within one boundary of the school ecosystem's daily dynamics. At the same time, these experiences permeate other boundaries of the school ecosystem, transitioning across different contexts and shaping each of them.

The teacher participants considered different features that marked the boundaries between one context generated inside the school ecosystem and another, such as space, time, location, and interactions (Dourish, 2017). For instance, C2's ICT practice entailed material (i.e., the Arduino) and virtual representations (i.e., the programming platform). The teacher foresaw the ways in which his students should understand how to produce an Arduino themselves (e.g., a traffic light and a bracelet for blind people they exhibited at the technology fair³⁰). In addition, the artefact constituted a learning resource and a social device through which pupils, with the teacher's guidance, generated outcomes while interacting with it that benefited a disabled group of people (i.e., the bracelet for blind people that notified them when they faced an obstacle). This result allowed learners to move beyond the physical and intellectual boundaries of that given learning and teaching experience by thinking of contributing to society with their products. Therefore, a teacher's reflexion regarding how carrying out a given ICT practice can move beyond the classroom experience from different viewpoints. Concerning pedagogy, the role played by the student (e.g., active or passive) can

³⁰ Please remember that the school recently decided to reform the Technology, Innovation & Projects department to incorporate a Project-Based Learning (PBL) framework as the pedagogical approach underpinning of teachers' ICT uses. The framework requires that students exhibit their projects. Therefore, the department decided to organise the first version of the Technology, Innovation & Projects (TIP) fair.

determine how other experiences or situations (e.g., helping blind people) permeate the current learning and teaching experience taking place at a specific space, place, and time.

Besides, the teacher and learners exhibited the Arduino at the TIP fair to other students and teachers. Different groups of students and subject areas came together at the venue and learnt from the products presented by the students. This situation reveals that within the institution, multiple sub-contexts interact, shaping how the community thinks of and uses ICT in practice.

The ways in which the students participated in the activity (i.e., their teamwork and internal organisation) constituted a first sub-context. Then, the teacher supported students when needed and guided them in their decision-making process regarding the production of the Arduino. He also designed, guided, and assessed permanently the learning process (through the school's reflexive practice model and the activities' assessment methods). He built an Arduino himself to teach students how to create and provide instructions to their own robots in the future. The description above constitutes a second sub-context. Both interplay and contribute to the process of the decision-making regarding teachers' ICT practice.

The teacher shared these experiences with the HoD and his colleagues in different reflexive opportunities I will detail later. It is possible to observe a third sub-context. A fourth sub-context was revealed by the fact that C2 also taught Physics to the same group of learners. Moreover, the workshop aimed at supporting the understanding of this subject's contents. In this sense, the teacher moved beyond the programming workshop intellectual and physical boundaries to consider other UGCs (i.e., the colleagues' reflexive practices and the Physics class). This information reinstalls Freire's (2014) argument that learning and

teaching are situated and that teachers must account for the broader ecosystem in which the situation is embedded.

Following this idea, the HoD of this department mentioned that students who usually do not perform well in Physics tend to achieve better learning outcomes while participating in the workshop. In her view, this situation happened because of the interactional differences between the workshop and the Physics classroom. While the latter was based on a teacher-centred approach, mainly drawn on content-delivery and Q&A strategies, the former was designed from a collaborative production perspective, in which pupils were the ICT practice's primary focus³¹. As I have mentioned before, C2 taught both courses to the same students (i.e., Physics and the workshop). This situation suggests that he was aware of the differences among both UGCs and the ways in which the boundaries between them interacted within the school ecosystem. The following quotation illustrates this example:

“In this workshop, we have those students who, perhaps in the Physics class are the most disruptive or disperse. But here, as this is a workshop in which we are moving, coming in, going out, we are always in transit. They are organised in teams. Then, the roles change. So, kids who commonly in other subjects, I mean, are less motivated or have lower grades, whatever, they enjoy a lot here because they are moving. The students who are a bit opaque in other subjects, they tend to shine here. And they have had a good time. And it caught my attention. No, it didn't catch my attention, really. But it was one of the comments of the Deputy Headteacher” C2 & C6's HoD interview).

³¹ For more evidence, please review appendix 12.

This quotation is interesting for various reasons. Firstly, it shows that the Arduino played a pivotal role in increasing students' performance compared to a 'traditional' or more teacher-centred Physics class. Moreover, the quote reveals that students increased motivation to learn while using the Arduino. Thirdly, it exposes another way in which the teacher participant's ICT reflexive practice (IRP) moves from the personal towards the institutional dimension. In this quotation, both the HoD and the Deputy Headteacher assessed C2's ICT practice. Figure 16 shows one example of the teacher supporting the Physics contents with the Arduino and the programming platform.

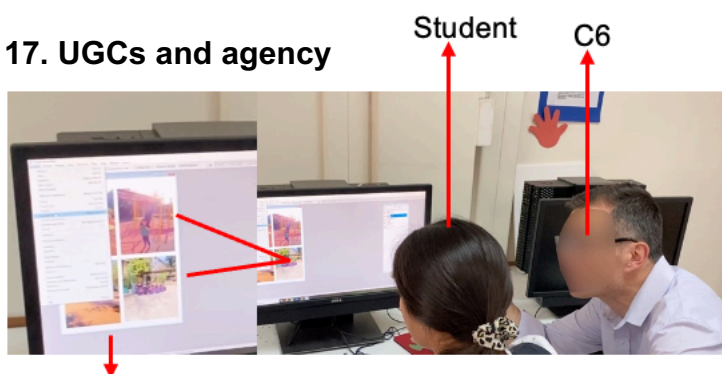
Generating unique contexts while developing their ICT practices implies that both teachers and students increase agency. Agency is seen in the data from two perspectives: a) the decisions reached by the teacher participants that facilitated students' agreements; and b) pupils' choices regarding the products to display at the fair. Both C2 and C6 designed learning and teaching experiences that involved students' independent learning, teamwork, and collaborative decision-making. These decisions did not imply an easy task. Regarding C2, the class I observed was the initial stage of understanding the programming language. The reflexive practice meeting took place one month later. In that opportunity, the teacher showed the Arduinos his students were building. In that conversation, C2 mentioned that some learners were working on the following traffic lights:

“C2: And the last one is a traffic light for blind people because the idea is that, when the green light turns on, for example, a sound turns on, explaining that it is the green light. One team thought of making a bracelet with a distance sensor that notifies the blind person that he or she is approaching an obstacle, such as a wall or something else (...)” (C2 reflexive practice meeting).

This quotation shows how the pupils' production depended upon each team's decisions, but with C2's guidance. In this way, the data reveals the teacher's and students' agency according to their roles in the learning situation. The students made the final decisions; the teacher participant revealed his agency by guiding the learning experience to take the most advantage of the Arduino and the programming platform as possible. This evidence resonates with Dewey's (1910, 1914, 1922, 1986) notion of reflexion as an intellectual process in which the teacher decides after profound critical thinking, assessment, inquiry, discussions, analysis, comparison, and contrast. This idea leads to transformation. In his view, such a transformative capacity empowers the teacher and provides sufficient degrees of freedom and agency to decide according to his learning and teaching conditions. In this way, Dewey's notion is revitalised and applied to teachers' IRPs. Therefore, while carrying out their IRPs, the teachers generate UGCs. In so doing, they and their students increase agency.

When teachers and students generate a new UGC, they are challenged to make sense of and transform a large amount of fragmented information into coherent meanings. When users make resources and information their own, they can make sense of them and increase agency. For instance, C6's students created a Photo exhibition that portrayed their experiences through Middle School. They had to integrate the Photoshop software language with another sort of personal learning that transcended the specificities of the Technology subject area. In this transformative process, learners, as ICT users, create learning and teaching contexts. The user's agency produces or shapes contexts, and simultaneously, the contexts' structures influence users—the teacher designed the learning and teaching experience in a specific way. The design also shaped how students carried out the ICT use by following the teacher's guidance. In this way, users generate contexts by consuming, transforming, or producing relevant resources for their meaning-making process (Luckin et al., 2011).

Figure 17. UGCs and agency



Integrating Photoshop language with Middle School lived experiences. Both make decisions and increase agency shaping their UGC.

Users increase their agency because they create and/or modify contexts according to their specific way of using resources, interacting with others while employing them, and making common sense of their information. In other words, from these interactions (i.e., user-resources-information), contexts are modified and adapted over time. Luckin et al. (2011) argue that contexts interact with each other, generating an 'ecology of resources' (EoR), a set of interrelated resources, people, objects, and interactions taking place within an ecosystem that could be the school community.

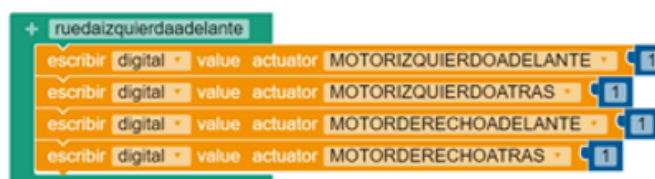
Although Luckin (2010 and 2018) focuses on the student, we can extrapolate her development of the EoRs to teachers as learners of their ICT practices. I will elaborate this idea in more detail later in this chapter. Freire (1998) sustains that teaching and learning need each other. Both are reciprocal activities. While teaching, the professional learns; while learning, the pupil teaches. Speaking of the EoR, or UGCs in generic terms, it is essential to understand that teachers generate complex contexts and increase agency while developing their ICT reflexive practices (IRPs).

Figure 18. The Arduino's role in supporting the understanding of Physics subject knowledge



The Arduino

C2, holding the Arduino, showed how the wheels would move if the students gave it specific instructions (0 or 1). He established links with Physics notions (0 = no mechanical work; 1 = mechanical work).



El valor 1 a la derecha, en la figura anterior, corresponde a que la acción se ejecute y cero a que no se ejecute. Translation: "The value '1' on the right, in the previous figure, corresponds to the action that the Arduino must perform. '0' is the action that the Arduino should not execute".
Si solo se quiere mover la rueda izquierda adelante, ¿cómo se debe programar la función? Piensen en equipo. Translation: "If you only want to move the left wheel forward, how should you program the function? Think as a team".

Simultaneously, students provided the commands to the Arduino on the online programming platform Open Roberta, by following the instructions and questions offered by the teacher in a printed leaflet.

Figure 18 represents the relationship teachers establish between virtual and material stuff while carrying out their IRPs, which is another feature that reveals the complexity of the UGCs produced by teachers and students (Dourish's,

2016). For instance, behind the algorithms and the 'virtual' platform Open Roberta, the USB cable, the computer, the Arduino, the room's furniture, and infrastructure were designed by the teacher to make the context work as expected. In this sense, the teacher integrated material and digital devices and resources and generated a hybrid context that produced a unique learning environment. Dourish (2017) uses the following phrase to represent the hybridity between materiality and digitization: "So the virtual objects that populate our world may all be bits, but they are not just bits" (p. 201).

Dourish (2004) uses the term 'embodied interaction' to explain how contexts extend beyond the physical boundaries in which tangible interfaces (e.g., the classroom, the computer) are set. Contexts encompass the devices used by people and the virtual environment offered by the device to enable interactions among users³².

C6 and C2 represent the idea exposed above. For the exhibition, the 8th grade students used Photoshop to manipulate the picture; they designed a traffic light and a bracelet for blind people, among other Arduinos, using a programming platform (i.e., Open Roberta) and different materials related to robotics. In both cases, a combination of physical and intangible resources, codes, and messages defined the interactions and students' understandings. Furthermore, the teacher participants decided that the immaterial resources would be different ICTs. C6 also used Google Drive to store the photos and print them after the class observation. The data, then, shows how the cases designed ICT learning and teaching practices that involved both material and virtual technologies. As a result, a learning and teaching context was shaped by different ICTs, and the same ICTs were shaped by the people using them within such a context,

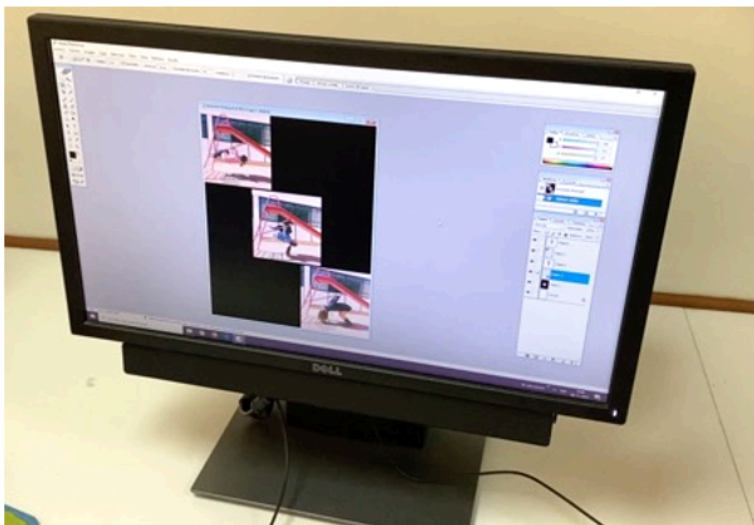
³² Please, remember how C6 and the pupils interact with devices, software, and Internet resources in figure 17 (p. 127).

generating products significant to the learners and teachers interacting with them (i.e., the photo exhibition and the Arduinos or robots).

Figure 19 shows how materiality and virtuality came together within C6's UGC. Although photo edition implies the abstract representation of certain codes³³, learners evoked memories of their journey through Middle School. Such experiences involved material objects. Besides, the artefacts related to the software use (e.g., the computer device, the desk supporting the computer) were also material. Even more, as Dourish (2017) suggests, the Google Drive Folder icon has the image of a physical folder. In this sense, contexts are made of a variety of material and immaterial or virtual stuff. Both cases clearly revealed this situation.

³³ While using Photoshop, students must learn a specific scripting language (e.g., javascript).

Figure 19. ICT meaningfulness for users



Note: The Photo exhibition's theme was the students' reflexion about their journey through Secondary School (i.e., 5th to 8th grade) because they were transitioning from that stage to Upper Secondary School (i.e., 9th to 12th grade). This group of students edited three photos of them playing in the school play yard, using the same slide, which seemed to be a significant memory.

Without using the Arduino in the ways C2 planned to do so, the activity would not have encouraged the learning outcomes it promoted. In other words, the ICTs, the students' and C2's decisions and actions offered the affordances visible in the class observations, the reflexive practice meeting, and the interview with the HoD, among other reflexive opportunities I will discuss further. Teacher agency played a pivotal role in determining the outcomes of this learning and teaching experience. The Arduino, as the teacher designed it, was crucial to foster the interactions and encouraged students to produce a traffic light and a bracelet that contributed to their learning and to the society at large. Interestingly, the students came up with that idea. This situation shows that learners' motivation and agency

were critical to the activity's successful outcome (Remijan, 2016). On the other hand, it shows that materiality and virtuality come together (Dourish, 2016), allowing teachers and students to generate unique teaching and learning contexts based on their representations from the particular ways in which they use ICT.

The teacher participants, then, generated complex UGCs from their own IRPs. The complexities were visible from different perspectives, such as the teachers' pedagogic intentions, the interrelationship between material and virtual stuff while using technology, the interactions between pupils within the same learning and teaching experience and even beyond, among many others. The integration of these features into the classroom experience with ICT provides its uniqueness. Figure 20 shows some examples of the unique interactions generated inside the C2's classroom experience, which included teacher-student, student-student, student-ICT, material or physical devices (e.g., the Arduino or the USB cable) and virtual or digital resources (e.g., the programming platform Open Roberta).

The evidence presented in this section shows that contexts are made and achieved by users (Dourish, 2004). They intertwine with activities and resources. In this sense, contexts depend upon features that interact with a group of people such as space, time, resources, and other people. As I have suggested earlier, this idea coincides with Freire's (2014) notion of situated learning and teaching. The learning situation is embedded in a broader ecosystem (i.e., the institution). It belongs to an even more extensive macrosystem composed of the learners' and teachers' socio-cultural and historical backgrounds, political and economic contexts, and other features that might influence the ICT practice.

Figure 20. C2's UGC: students-ICT-teacher interactions

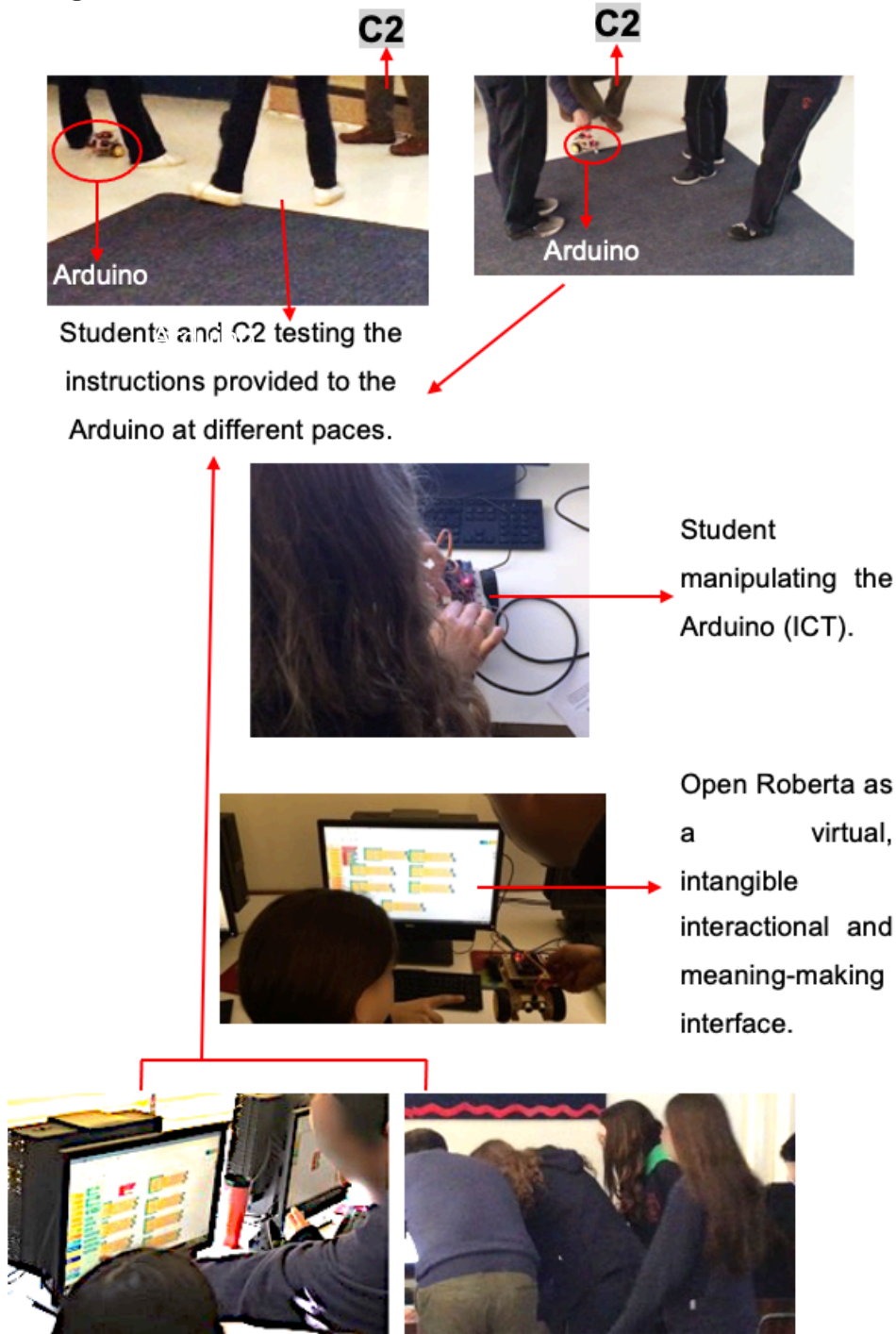
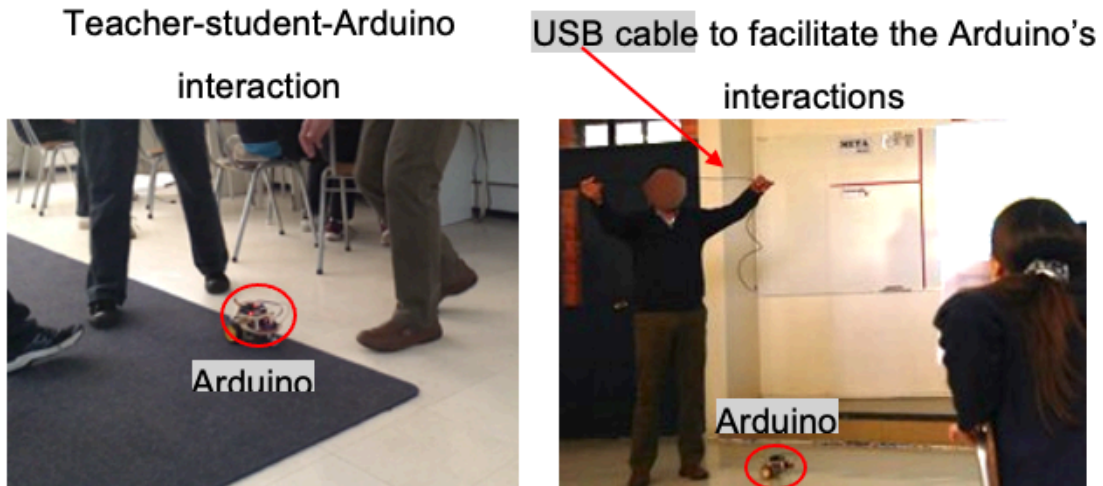


Figure 21 shows different features considered by the participants, which while intertwined, helped students and teachers make unique contexts. The Arduino, the programming platform, the USB cable, the Internet, the Photoshop software, the Google Drive folders, and the computers aided pupils to achieve specific learning outcomes associated with the school's policy of integrating a project-based learning (PBL) framework (i.e., critical thinking, collaborative and creative problem-solving, metacognition, and agency). The room's furniture was organised in a particular way so that pupils could test their products, and the teacher could supervise and support each pair's work. Time was designed towards each pair's progress to generating an artefact for Technology, Innovation & Projects (TIP) fair. The exhibition constituted a broader dimension, representing the institutional domain because teachers and students of other courses were these learners' audiences. They created a new UGC with ICT³⁴.

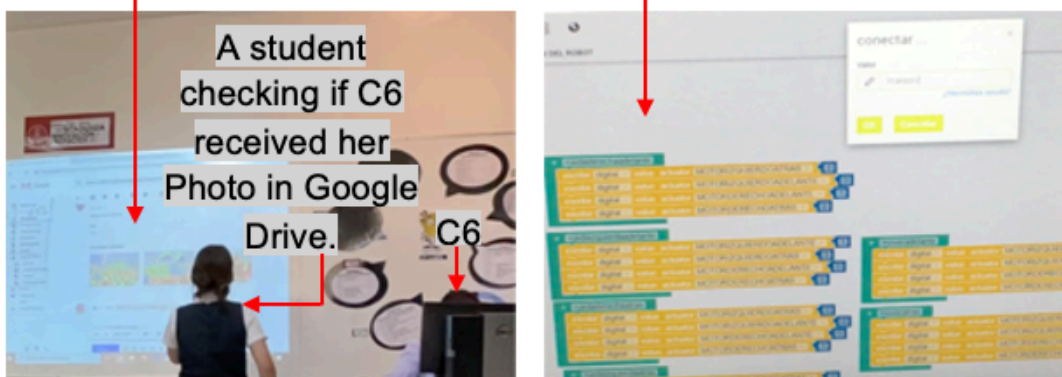
Contexts are dynamic experiences socially produced and recognised by users within their everyday mutual understandings (Dourish, 2009). The data can evidence the social dimension of UGCs in two ways. First, it can be seen through the students-ICT-teachers' interactions. Secondly, this dimension was visible through the in-person and ICT-mediated reflexive practices. I have extensively discussed the first idea before. The second idea is associated with the last finding presented in the introduction of this chapter.

³⁴ Considering that 2019 was the first year of the TIP exhibition, teachers decided to keep the event private to safeguard students' frustration that could emerge from any inconvenient or potential eventuality. For this reason, I did not observe the fair.

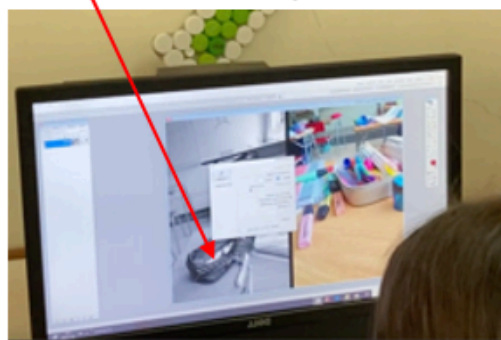
Figure 21. ICT resources used by the students and the teacher participants



Internet as another interface or interactional sub-context (i.e., Google Docs, Google Drive Folders, Open Roberta programming platform)



Photoshop use as intangible interfaces or sub-contexts



Interestingly, these teachers generated two different reflexive practice contexts: a) in-person, through the formal CPD reflexive practice meetings determined by the institutional policymakers; and b) reflexions through Google Drive use to design and amend their practices towards the production of the TIP fair. They decided to discuss the implications of their ICT practices through Google Drive because they did not have enough time to meet altogether and make collective decisions in-person. It is important to note that this is a large department. It contains nine disciplines and nine different teachers. One of them only worked at the school on Fridays; therefore, her collaboration through Google Drive at the departmental reflexive dimension was significant. In this sense, it is possible to observe a new UGC: an online context that supported teachers as learners of their ICT practices and increased their agency regarding their ICT usages with pupils. The following quotation illustrates this finding:

“And that work was also quite good. I mean, that collaborative feature, in the, in the Drive document. The truth is that it really worked out well (...) So, in this Drive document we shared quite basic things. But, you know, they were useful because they were associated with how... How did we make this thing work? Because, imagine, C2 on one side, C6 on the other side. C2 is the head of another department. He runs across the entire school. He has a lot of class hours. It’s hard. We have the teacher of Social Projects. She comes to the school only on Fridays. And she collaborates on the Drive document every day. This was the first time that I worked with Drive in a way so, so, collaborative. And then, everyone made their suggestions, being them operational or pedagogical” (C2 & C6 HoD’s interview).

This quotation is crucial for several reasons. Firstly, the example shows how collaborative decision-making, therefore collective agency (Freire, 2011), is enhanced with ICT by fortifying their IRPs. According to Freire (1998), the

collaborative agency must be open to colleagues', authorities', and pupils' ideas. In his view, it consists of living:

“(...) in openness toward others and to have an open-ended curiosity toward life and its challenges is essential to educational practice. To live this openness toward others respectfully and, from time to time, when opportune, critically reflect on this openness ought to be an essential part of the adventure of teaching” (pp. 121-122).

Although the same scholar highlighted the relevance of increasing our vigilance to the rapid investments and developments in technology (Freire, 2005), in this piece of evidence we can see the potential of ICT to foster teachers' conscious IRPs through ICT and blended UGCs.

Secondly, the quotation is relevant because it shows a practical way of coping with time constraints to teachers' IRPs. The mode of doing so is precisely by using ICT, which also may help teachers increase their technological competencies either in technical or reflexive terms. Therefore, Google Drive, when used consciously, revitalises Freire's (1998) idea that the teacher exerts both roles: that of an educator and a professional learner. As Dewey (1910) suggests, conceiving the teacher as a learner leads to understanding reflexion as innovation. This idea coincides with C2's vision about the role of the teacher. In his view, every educator must understand that his/her profession is vocational; therefore, it implies efforts that other professions do not. In this sense, teachers must always seek innovation and devote extra time to finding new ways to increase learning among pupils. Human beings and learning resources evolve, and teachers must adapt to such changes. In C2's own words:

“A teacher who does not innovate becomes a machine. He/she always does the same thing. So, every time that I see new things, I try to get

involved. Maybe it does not fit here, but I could argue with my example. That's why I got involved in the programming workshop because I'm motivated with that plan (...) So, when do you do the other things associated with the workshop? At home. Investigating what is best, in my case, if 'Scratch', if 'Open Roberta', or 'Code.org'. And then I try to combine things. And when do you test that? Because I must test it before. I cannot use it in class without testing it. I do it at home. Sure, on Saturdays and Sundays. And that's what I mean by vocation" (C1's HoD interview, who is also C2).

The teacher as a professional learner must seek innovation based on deep reflexion. In that journey, he/she generates and is being shaped by contexts embedded in the school ecosystem and beyond (e.g., home). C2 had a different disposition towards the role of the teacher from the rest of the cases, even from C6. The other teacher participants did not reveal the same vision about teaching as a vocational and innovative profession. His understanding of time enabled him to design and build the Arduino himself, which none of the other professionals did. The robot afforded collaborative learning, creative problem-solving, metacognition, the students' capability of presenting in public (i.e., during the fair), their understanding of the Physics contents, and serving a specific disadvantaged group while performing all these activities. The ideas presented in this paragraph reveal how a teacher who considers the ecosystem and beyond while developing his/her ICT practices can generate meaningful outcomes for him/her, his/her students and even others.

Contexts depend upon the skills, knowledge, understanding of the persons generating them. In this sense, the contexts' dynamic nature offers analytical challenges for their assessment, replicability, and transferability. Despite the difficulty mentioned above, either by considering the EoR or understanding the

material and intangible features that compose a specific UGC, both conceptualisations nurture the understanding of teachers' IRPs. Both notions of UGCs allow them to identify ways in which users, space, location, interfaces, software, Internet resources, time, and interactions can generate specific learning affordances.

C2 & C6 illustrate these ideas. The Arduino generated a unique learning and teaching context and afforded collaborative and creative problem-solving, metacognition, deeper understanding of the 'mechanical work' concept specific to the Physics subject area, the possibility of learners to exhibit products meaningful to them and blind people. The Photoshop software and Google Drive folder also afforded the skills mentioned above. Both cases afforded personalisation, considering the ways in which they organised their learning and teaching experiences. Each pair of students worked independently with the Arduino or their personal accounts in the programming platform or Google Drive folders. Different virtual micro-contexts generated within the classroom contexts. Broader reflexive contexts were generated about ICT by using ICT (i.e., the teachers' shared Google Drive folder).

In this sense, the ICT resource combined with the teachers' reflexion³⁵ about the ICT generated specific learning affordances that were difficult to replicate faithfully to other learning and teaching practices. This is what makes learning - and learning with ICT- situated. Freire (1998, 2005, 2011, 2014) and Dewey (1910, 1914, 1922, 1938 & 1960) are reinstated into the discussion. The teacher participants as professional learners made sense of information, knowledge, and the resources available to them in a specific space and time. They made decisions collaboratively while increasing agency, as well as their reflexive

³⁵ Understood as the interaction between the professional's personal classroom experience, the departmental collaborative practice, and the consideration of the institutional domain.

capacity. They also adapted their working conditions within the boundaries of the school ecosystem facilitating constant evolution and innovation.

In what follows, the conclusions chapter, I will present my primary contribution to knowledge in the thesis. The UGCs' concept combined with the notion of RP I discussed in chapter 2 allowed me to generate an ICT reflexive practice (IRP) framework useful for institutional policymakers and CPD providers regarding teachers' ICT practices.

Part 4. Developing an ICT reflexive practice framework as CPD to increase teacher agency

Chapter 6. Conclusions and discussions

My thesis has focused on six schoolteachers' IRPs to consider the broader ecosystem in which they are embedded. Such a consideration enables the professionals to generate unique and complex UGCs according to their teaching conditions and the potential affordances they see in ICT. In a world where ICT occupies an increasing place in education, teachers must gain sufficient degrees of agency alongside professional learning opportunities to understand 'why', 'which', and 'how' to develop authentic ICT practices for ensuring their pupils' learning (Albion & Tondeur, 2018). This thesis discusses the problems associated with teachers' ICT practices reported in Chilean and international research and its relationship to reflexive practice (RP), agency, and CPD. Based on two perspectives of RP (Dewey, 1910, 1914, 1922, 1938 & 1960; Freire, 1998, 2005, 2011, 2014) and two approaches to user-generated contexts (Dourish, 2004; Luckin, 2010; Luckin et al., 2011; Luckin, 2018), I have investigated different teacher participants' ICT reflexive practices (IRPs) to develop my primary contribution to knowledge: an IRP framework I will present in this chapter. In what follows, I will summarise the key findings by responding to the research questions and presenting the framework. I will briefly return to the primary issues dealing with teachers ICT practices to justify the significance of the framework. I will conclude discussing areas for further research and implications to teacher professional development.

1. Key findings

The ICT reflexive practice (IRP) framework provides information to practitioners, policymakers, and researchers about how teachers' ICT practices are being

developed, assessed, and refined over time. Such information is significant to increase practitioners' self-consciousness and agency about their ICT practices. It also enhances decision-making processes regarding teaching with ICT by including all the agents involved in the school ecosystem and beyond (e.g., teachers, HoDs, Headteachers, Deputy Headteachers, students, among others). The framework shows a multidimensional perspective from which to explore teachers' IRPs. Before explaining the framework, it is vital to discuss how this thesis has responded to the research questions. Although all the research questions interrelate, the third question refers more explicitly to the framework.

a. Responding to the research questions

1. In what ways are the teacher participants' ICT practices developed through and developing beyond the Reflexive Practice Model (RPM)?

To address this research question, it is crucial to consider the subsidiary questions.

- a. What RPM features are developed to facilitate ICT practices?
- b. How are these features operationalised through the institution's CPD policy?
- c. What additional features have the teacher participants been developing beyond the RPM?

Chapter 2.2 of the literature review was the primary foundation of these four questions: the notion of reflexive practice as embedded in the broader ecosystem (i.e., the school), which is part of broader socio-cultural practices (i.e., national policies, research, economy, the society at large).

Additionally, in the introduction and the sampling section, I explained how the research context developed a reflexive practice model (RPM) specific to the teacher participants' ecosystemic conditions and socio-cultural background (see section 3.1.a). Among other purposes, the model aimed at shortening the gap between policy and practice, generating 'informational bridges' that fostered collaborative decision-making according to the responsibilities and roles assumed by each school staff member (or agent). In this sense, the RPM produced a school community that made choices regarding teachers' ICT practices considering every layer or dimension of its ecosystem (i.e., from the baseline to the top and conversely).

Moreover, the RPM allowed the participants to bridge the gap between theory and practice. The pedagogical frameworks underlying teachers' ICT practices were pivotal to understanding the ways in which the school's RPM aided teachers' ICT practices. Both TfU and PBL are highly 'reflexive' by nature.

The TfU was created and is being developed by academics of Harvard's School of Education to improve ICT teaching practices. The framework is inspired by the socio-constructivist theory and aims at encouraging the learner's deep understanding through critical thinking, creativity, and metacognition (Nickerson, 2012; Stone Wiske et al., 2013). PBL approaches are also in their majority meant to be implemented inside schools to increase pupil's learning (Callaghan, 2016; Svihla, et al., 2015; Svihla, 2016). Interestingly, this school ecosystem decided to develop a RPM based on both frameworks' principles, which are initially thought for students, such as making thinking visible, collaborating with colleagues towards creative problem-solving, and engaging in metacognitive activities that allow them to refine their practices or propose amendments for the future. This idea echoes Freire's (1998) claims that teachers must become learners of their own practices. Applying the principles to the teachers allowed this school to develop a holistic and dynamic approach to their IRPs.

Time was another feature that sometimes facilitated and constrained teachers' IRPs. The teacher participants were provided with formal meeting hours to design and assess their ICT practices. When time was a limitation, the RPM was so embedded in their mindset they used other informal opportunities to develop their IRPs, including the use of different ICTs (e.g., Google Drive or WhatsApp). Therefore, dialogue and collaboration were key to configure a RPM that aided thinking about and refining the participants' ICT practices. On the other hand, teachers could generate dynamic reflexive contexts composed of material and virtual features producing unique reflexive contexts suitable to their specific professional learning needs (Dourish, 2014, 2017; Luckin, 2010, 2018; Luckin et al., 2011). ICT afforded exclusive learning outcomes for students; reflexion constituted a way of collaborative and dialogic agency among the school staff. This situation suggests that, while learning about their ICT practices, they can also learn about ICT in technical and pedagogical terms. The dialogic dynamics guided their IRPs through their hybrid reflexive environments. More specifically, it is interesting how ICT became another feature that could increase collaborative IRPs, therefore, collective agency.

Figures 1, 2 & 3 presented in the former part of this thesis portray how these features are operationalised through the RPM as CPD policy (see section 3.1.a). Reflexion moved across the institutional ecosystem permanently. It was deeply rooted in the school's daily life. Each school staff member was aware of his/her freedom of action and responsibilities (e.g., the HoD provided feedback while teachers knew that they could feedforward ideas to resolve challenging issues as it occurred in all the reflexive practices meetings observed). Such an acknowledgement involved the ethical aspect of reflexive practice, in which everyone chose towards increasing learning within the boundaries of the school ecosystem and beyond. Although it did not always happen that way, the

institutional RPM as CPD policy aimed to fortify collaborative agency among the staff, avoiding the generation of arbitrary decisions.

2. Beyond the CPD model promoted, what other ecosystemic dimensions do the teacher participant consider as part of his/her ICT reflexive practices?

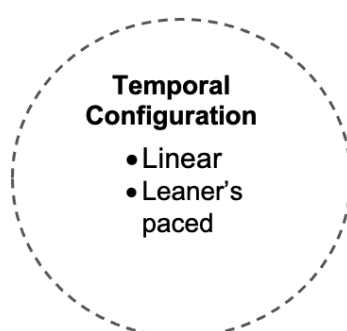
My thesis's most significant contribution to knowledge is the ICT reflexive practice (IRP) framework illustrated in figure 22 (see page 148). The framework draws on the relationship between reflexion and ICT practices as a CPD model deeply rooted in the school ecosystem. In this way, while considering the interplay between the three RP dimensions (i.e., personal, departmental, and institutional), the teacher also bears in mind different features specific to ICT in his/her teaching context.

The IRP adds consciousness about ICT to the school's existing RPM. Drawing on the notion of UGCs (Dourish, 2004, Dourish, 2017; Luckin, 2010; Luckin et al., 2011, Luckin, 2018), the framework brings to light the rationale of teachers for developing their' ICT practices. Thus, it serves as an instrument to assess teachers' ICT practices from different angles and perspectives.

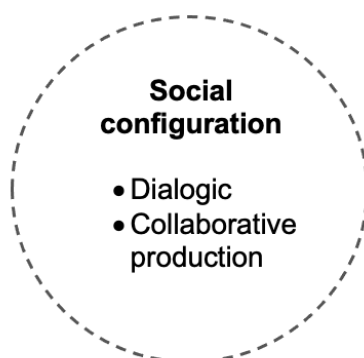
Suppose a school policymaker expects more innovative than 'conventional' or teacher-centred ICT practices. In that case, the framework will help to identify the kind of practices teachers carry out while using ICT and their pedagogical preparedness to use them with pupils. Policymakers and teachers can use the framework as a reflexive instrument in the three reflexive dimensions (professional, departmental, and institutional). For instance, teachers can use the framework to design, self-assess their practices, and discuss their practices with colleagues with the framework at hand. The HoDs can use it as an observational

instrument to further provide feedback, discuss the implications of the practice with teachers, understand teachers' rationales for using ICT in a specific way, and agree with them on future decisions together. After those actions are taken, they can share such experiences with other policymakers, with the framework at hand, to make more comprehensive decisions regarding teachers' ICT practices. Some examples could be the budget destination for each department for purchasing specific software or hiring a particular professional development programme for a certain group of teachers according to their needs. In this example, after gaining the three levels of discussion, teachers and policymakers will jointly reach a more holistic and conscious decision suitable to the conditions of their particular institution.

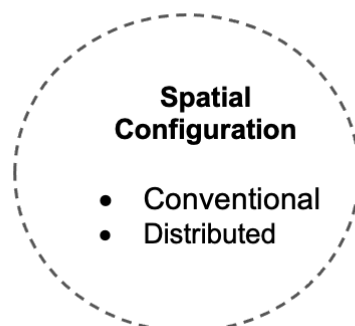
Figure 22 shows the IRP framework. The framework serves as a guide for teachers (e.g., a self-assessment and collaborative decision-making guide), HoDs or Deputy Headteachers (e.g., an assessment and a decision-making instrument regarding CPD provision about teachers' ICT practices). It can also aid other CPD providers (e.g., external consultancy companies hired by the school) to the institution in the development of conscious IRPs. The diagram shows that, while carrying out their IRPs within the school ecosystem, practitioners should integrate the three reflexive dimensions according to their specific teaching conditions (see the circles entitled 'PRD', 'DRD' and 'IRD'). Like previous figures, the circles are presented with penetrable lines to show permeability across dimensions. Within these dimensions or layers, teachers should consider three crucial features: temporal, social and spatial configuration of the ICT learning and teaching experience.



For temporal configuration, the teacher should look at how time is structured in practice to achieve the learning outcomes while ICT is intervening in their learning experience. Will time be organised in a 'traditional' way (e.g., 1 or 2 45-minutes length class hours)? Alternatively, will the teacher focus on how each student progresses to achieve the learning outcome/s?³⁶



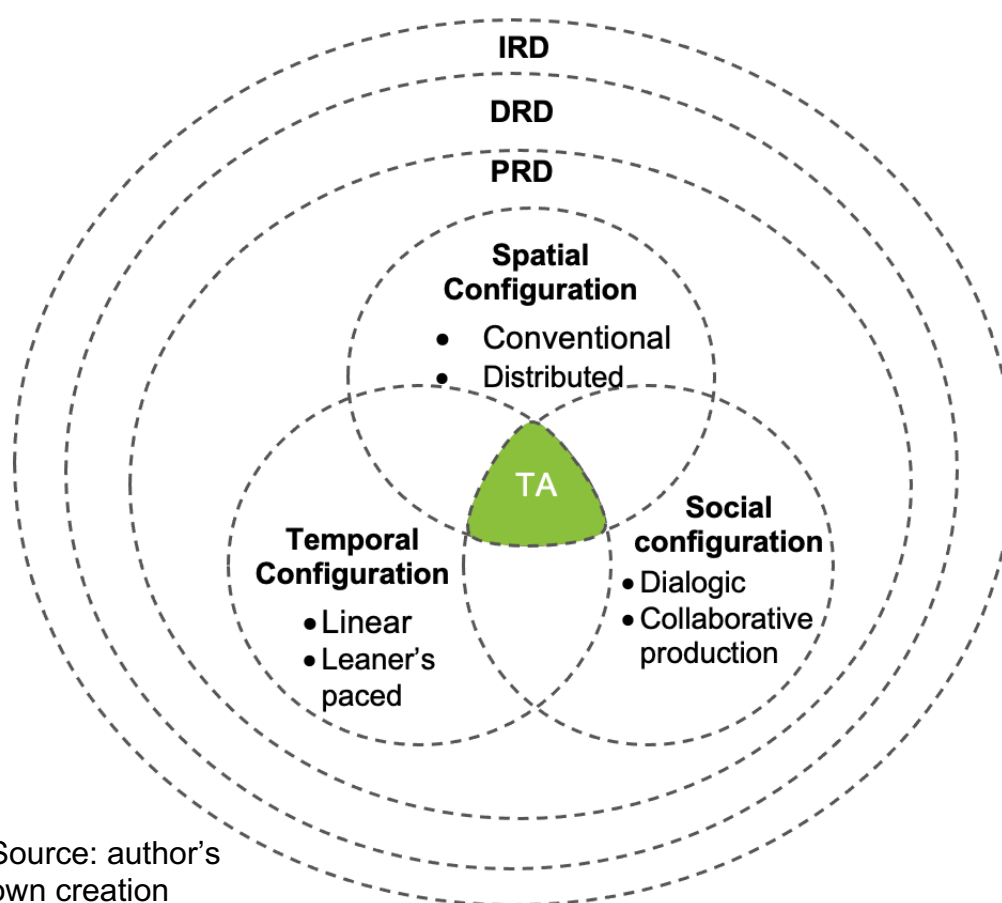
For social configuration, the teacher should consider how students will interact with each other and the ICT. Will they use ICT to talk and discuss the content further? Will they move beyond discussion and get more involved in the learning process by producing something concrete?



³⁶ Please remind C2 & C6. There is also more evidence about this idea in appendix 12. C2 spent time after class with some pupils who desired to keep testing the Arduino. Time, then, transcended the formal temporal configuration.

Finally, for spatial configuration, the teacher must think of how the space in which pupils are learning is organised (i.e., online platform, physical space, or both). Is it a traditional classroom with desks structured in rows facing the whiteboard? How is the furniture distributed throughout the room? Is the learner at home? If that is the case, does he/she have an isolated place to study? Are students working individually or in groups? Among other considerations.

Figure 22. The IRP framework's features³⁷



³⁷ **Notes:** TA = Teacher Agency; PRD = Personal Reflexive Dimension; DRD = Departmental Reflexive Dimension; IRD = Institutional Reflexive Dimension.

The features reveal the combination of the RP and the UGCs' notions. In the ICT practice, the teacher designs contexts that imply the interconnectedness of material and virtual resources, interactions, locations, time, space, people, among other features (Dourish, 2004, 2009, 2016, & 2017; Luckin, 2010 & 2018; Luckin et al., 2011). When the teacher foresees these features, he/she contemplates carefully every detail involved in the practice: the classroom dynamics and beyond. For instance, when C2 designed and assessed while implementing the ICT practice with the Arduino, he foresaw the teacher-students-ICT interactions 'inside' the classroom, within the 'virtual' boundaries or frames that defined the programming platform Open Roberta, and even beyond, at the Technology, Innovation and Projects (TIP) fair. The same situation was visible in C6, with the Photoshop Software and Google Drive use, and the exhibition at the fair. Similar activities, suitable to other learning and teaching contexts, could be applied in different school ecosystems.

It is essential to highlight that the application of the framework is flexible because it depends on teachers' agency and the lesson's focus or the expected learning outcomes. The emphasis the professional gives to each of the features varies according to his/her reflexive capacity about the possibilities he or she has to carry out the learning experience in a specific way. In other words, while designing, implementing, and assessing the ICT practices, the teacher must consider the features and dimensions presented in the diagram. However, the extent to which he or she follows each of the features in each teaching design may differ according to the UGCs the professional will generate with the learners while using ICT.

Teachers and students, then, generate nuances in the combinations between features³⁸ and across dimensions. This situation will provide different answers to the person who assess the practice (i.e., the professional him or herself, colleagues, policymakers, researchers, or other stakeholders). It is crucial to keep a reflexive mind across the entire process and ecosystemic dimensions (i.e., PRD, DRD & IRD). From the data and relevant literature to ICT teaching practices, CPD and RP, it is possible to conclude that a teaching design that combines learners' paced temporal, collaborative production, and distributed spatial configuration is more likely to take advantage of specific ICT affordances associated with the so-called 'higher-order skills', such as collaborative and creative problem solving, critical thinking and metacognition. However, such an outcome may not occur if the teacher does not consider reflexion and the overall ICT practice in dialogue with the different dimensions that configure the entire school ecosystem and beyond. Real transformational ICT practices are possible. However, sustained reflexion deeply rooted in the daily school dynamics is needed.

Teacher agency converges within the three concentric circles because educators must think, discuss, and decide how to configure their ICT practices according to these three features and within the three dimensions. While considering all the framework's layers and features, teachers become the agents who decide 'why', 'which' and 'how' to use ICT in practice. This idea is consistent with Albion & Tondeur's (2018) assertion that teachers must chose freely how ICT can enhance learning according to their teaching conditions. However, freedom does not mean

³⁸For example, a teacher can generate a context based on linear temporal configuration, dialogic social configuration and distributed spatial configuration. Another professional can produce a context governed by the learner's paced temporal configuration, collaborative production social configuration, and distributed spatial configuration. A third teacher can develop his/her ICT practice based on linear temporal configuration, dialogic social configuration and conventional spatial configuration. And so forth.

that the teacher can act arbitrarily. According to Freire & Shor (2014), freedom is social and entails high responsibility for others. That is the reason for considering the features and layers of the school ecosystem.

It is essential to mention that these three features intertwine and influence each other. This idea is consistent with the argument that learning, and teaching depend highly on the context and echoes the claim of Stockless (2018) that “the integration of ICTs is a complex process for teachers to use, since the dynamics of the contextual variables that influence an innovation in education are complex in themselves” (p. 1102). Therefore, the everyday school dynamic can influence, to some extent, how teachers consider these features.

This section has discussed two aspects of the IRP framework. Firstly, I emphasise the pedagogical features and learning outcomes the teacher participants should consider while developing their IRPs. Secondly, I delve into the interplay between the three reflexive dimensions, namely, personal, departmental, and institutional. Figure 21 illustrates how teachers should account for three features to configure their ICT practices in specific ways: spatial, social, and temporal configuration. The figure reveals teachers’ pedagogical position underlying their ICT practices. On the other hand, it shows the ways in which agency plays a pivotal role in the professional’s interpretations and decisions regarding the integration of their ICT practices with the pedagogical traditions supporting their ICT usages.

In this way, a participant that draws his or her practice on a linear temporal configuration, dialogic social configuration and conventional spatial configuration will be more likely to develop ICT practices based on a teacher-centred approach encouraging a more passive role of students in their learning. For instance, C1, C3, C4 & C5 drew their ICT practices on such a consideration resulting in ICT practices that supported conventional rather than enhanced or transformational

usages³⁹. It also could reduce the teacher's possibilities to increase his/her learning about teaching to other dimensions of the school ecosystem. The conventional teacher-centred approach provides learners and teachers with less flexibility, lower agency, and less dynamism to interact with resources, share perspectives, inquire, collaborate, discover, and generate new knowledge and contexts according to their unique learning conditions. As suggested by Freire (2014), alongside other socio-constructivist theorists (Lave & Wenger, 1991; Vygotsky, 1978), learning and teaching are situated. They are embedded within the institution. They are part of a broader system composed of the school community's socio-cultural, socio-political, and historical backgrounds. In his view, all of them shape the educational practice. Simultaneously, the teacher is responsible for critically understanding how these features can influence his/her practices and transform them. The same principle must be applied to technology (Freire, 2005):

“This critical understanding of technology, with which the education we need must be infused, is one that sees in it an increasingly sophisticated intervention in the world, one that must necessarily be subjected to the political and ethical test. The greater the importance of technology becomes today, the more pronounced becomes the need for rigorous ethical vigilance over it” (Freire, 2005, p. 85).

In this sense, teacher agency (TA) must be the centre of the framework. We must acknowledge that ICTs have been created for specific purposes. Teachers need time and support to see other ways to transform a given ICT use for other purposes different from its creation. For instance, although blogs can foster

³⁹ You may find evidence related to this specific issue in appendix 12. Please remember that I did not disclose all the data in the findings chapter.

writing skills in Spanish or English, teachers and students can use them as metacognitive journals for a science lab project.

Summarising what I have said so far, the framework is a flexible and valuable instrument to different agents involved in teacher professional development. It allows teachers, policymakers, and researchers to recognise the features professionals should consider while developing their ICT practices. It also allows understanding the rationales for the teacher's choices. The IRP framework is flexible enough to be used in multiple ways. It can constitute a self-assessment tool, a collaborative evaluative framework (e.g., an instrument to guide the discussions in the reflexive practice meetings). It can also help policymakers observe how teachers use ICT, what challenges they perceive, what they should communicate better, and what features teachers consider while developing their ICT practices. Finally, researchers can use it to bridge the existing gap between theory, policy, and practice regarding teachers ICT uses with pupils. They can also use the framework to detect or understand exemplary cases that other school members can follow.

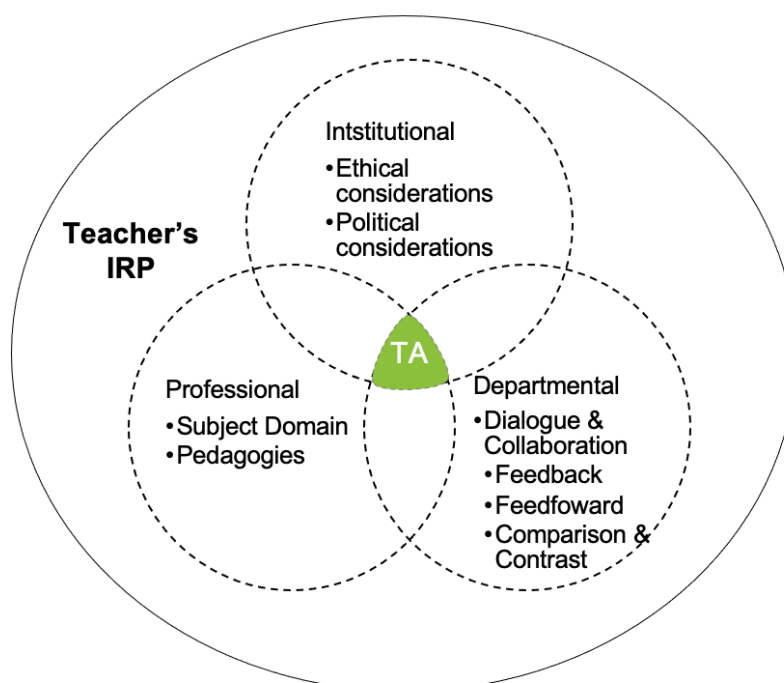
The IRP framework reveals the pedagogical foundations and implications of a given ICT use. On the one hand, it focuses on the baseline, micro-level, and classroom practice (which can currently be in-person or online⁴⁰). On the other hand, it shows how teachers design, carry out and assess their ICT practices by considering what happens in the learning and teaching experience and broader features and dimensions of the school ecosystem. In this sense, the first part of the framework (figure 22) helps respond to research question n°2. The second part (figures 22 and 23 integrated) clarifies research question n°3. In what follows,

⁴⁰ A researcher or even an HoD can observe an online class (i.e., through videoconferencing) or a face-to-face class. Then, he or she can hold a reflexive practice meeting with practitioners, again, through videoconference or in-person.

I will discuss how the reflexive dimensions were integrated into the school ecosystem as a formal CPD towards increasing teachers' agency.

3. How do the personal, departmental, and institutional dimensions interplay within an ICT reflexive practice model?

Figure 23. Reflexive dimensions' interplay⁴¹



Source: author's own creation

Figure 23 constitutes a sub-category of the IRP framework. More specifically, it shows the interplay between the three reflexive dimensions. Each dimension contains features that should be operationalised inside a given institution but generated at the macrosystem (i.e., subject domains, pedagogies, dialogue & collaboration, and their sub-features, as well as ethical and political considerations). These features intertwine and iterate, producing a reflexive spiral

⁴¹ Note: IRP = ICT reflexive practice; TA =teacher agency.

that moves back and forth permanently, configuring a unique CPD model deeply rooted in the school's daily life. This idea revitalises Dewey's (1910) and Freire's (2005, 2011 & 2014) notion of 'reflexion' as ongoing, multidirectional, and iterative. According to Freire & Shor (2014), reflexion is associated with "the act of knowing at the same time creating and recreating, while educating the students, that they are getting to know" (p. 187). In line with Dewey (1910), the authors argue that teachers must think permanently about how designing (i.e., creating) and refining (i.e., recreating) learning and teaching experiences suitable to their specific learners and contexts. Moreover, such a process is social (Freire, 2005). For these reasons, the dimensions interplay and must be integrated into the school's everyday life. In the following paragraphs, I explain each dimension and feature.

In the professional dimension, the teacher thinks about the features specific to his/her profession. On the one hand, teachers must think of integrating their ICT practices with the subject area they teach. On the other hand, and concerning the idea mentioned above, the educator must consider the pedagogical implications of their ICT practices (i.e., 'should I use ICT?'; 'why?'; 'what ICT should I use?'; 'how can I foster authentic learning among my pupils through its use?'; 'after using a given ICT, what were the learning outcomes and implications?'). The pedagogical feature is associated with the learning purposes and outcomes⁴², the learning and teaching strategies, as well as the assessment methods. In the case of this school, TfU & PBL were pivotal to enhancing teachers' IRPs because they acted as the pedagogical frameworks that helped teachers answer such questions.

Following Freire's (2005) argument that learning and teaching are social, it is essential to acknowledge that the professional reflexive dimension is insufficient

⁴² These learning purposes and outcomes were discussed in the previous section.

to improve teachers' ICT practices over time. In this way, I suggest that the educator must move one step forward and reunite with colleagues and the HoD (or any other equivalent role existing in another school ecosystem) to discuss the practice, share experiences and make collective decisions. In this dimension, the following reflexive dynamics can generate: HoD's or other colleagues provide feedback; the professional feedforwards ideas regarding challenging issues to the team; in so doing, each teacher compares and contrasts his/her practice with that of the colleagues, reaching conclusions and agreements.

Reflexion must consider broader implications of the school ecosystem. In this way, teachers move another step forward by considering the institutional dimension. When comparing the 'reflexive practice' theory with the teacher participants' IRPs, I observed two features relevant to their ICT practices: a) political; and b) ethical. The political considerations are associated with issues such as:

- The provision of additional PD opportunities to the teachers beyond and complementary to the RPM as CPD.
- The permanent dialogue between the baseline and the top.

The ethical feature is associated with the promotion of learners' and teachers' common good. Teachers must draw their decisions on their students' specific needs in combination with features generated outside the school ecosystem, such as the ICT integration into the national curriculum, the articulation of the pedagogical frameworks and the ICT practice, economic implications such as the budget available, educational technology products offers, among others. In this way, teachers and the whole school staff move forward by contemplating how the broader macrosystem influences the practice. This idea echoes Freire's claim that: "(...) professionals discover that their ability to understand that reality is broader than the horizons of the institution". [A partir de esse ponto de referência,

o profissional descobre que sua capacidade de entendimento da realidade é mais ampla do que os horizontes da instituição] (Freire & Nogueira, 1989, p. 56).

The ethical dimension implies that teachers pursue students' authentic learning, which entails caring for their common good. Teachers must be conscious enough to exert their profession responsibly: "How can I educate without being involved in a critical understanding of my own search and without respecting the students'?" (Freire, 2014, p. 10).

PBL's incorporation and the department's reform respond to the school's commitment to authentic learning. For instance, one of the reasons for shifting to PBL was the need to subsidise other subject areas in two aspects: a) promote the so-called 'higher-order skills' on students (i.e., critical thinking, collaboration, and creativity, among others); and b) reinforce students' understanding of other subject areas through greater active student participation.

Both aspects are related to time. Time is always lacking in any daily school routine. Therefore, one solution to such a specific need for these professionals was the integration of PBL into the Technology curriculum. It is possible to observe how PBL's integration into the school ecosystem as an explicit policy regarding teachers' ICT practices is a result of a reflexive activity that involved ethical and political actions. Such decisions were undertaken after a series of conversations held from the baseline (i.e., teachers' ICT practices) to the top (institutional policymakers such as the Deputy Headteacher alongside the Headteacher) and then from the top to the baseline. During the reflexive practice meetings, teachers and this HoD discussed the budget needed and available for developing some activities (e.g., purchasing a specific software license or materials for the construction of the Arduino). The HoD took notes and mentioned that she would discuss this issue with the Deputy Headteacher. Besides, in the interview, regarding this specific matter, she mentioned that the institutional

backup was fundamental to the success of this new shift in the department. Furthermore, despite these teachers not having enough time to hold reflexive practice meetings face-to-face, they were so committed to the innovations taking place in the department, they came up with unconventional ways of developing their IRPs.

Teachers must subject their understanding of learning as a life-long self-assessment process both to the students and their own role as educators. Interestingly, C2 & C6 understood that students' assessment moves beyond the professional layer to apply a similar kind of evaluation to their own practices in the broader reflexive dimensions (i.e., departmental, and institutional). Following this perspective, Freire (2005 & 2011) and Dewey (1910) understand reflexion as a continuous self-evaluative process. Hence, the frameworks underlying the teacher participants' IRPs (i.e., TfU, PBL and RPM) nurtured each other to generate unique ICT practices. Stone Wiske et al. (2013) highlight the linkages between pupils' ongoing assessment and professional learning as a permanent evaluative practice:

By enacting the key features of ongoing assessment, educators build in multiple opportunities to monitor and support students' progress, using assessment criteria that focus on target goals. And finally, the key features of reflective, collaborative communities remind teachers to consider ways of engaging learners in interactions with one another and possibly with others to promote their learning (pp. 17-18).

This quotation illustrates how TfU highly influences the ways in which the RPM is being operationalised inside the school. Theoretically speaking, if teachers understand reflexion as ongoing, they will be more likely to foster such learning among students (Stone Wiske et al., 2013). This idea persists today. For instance, Schildkamp et al. (2020) report that opportunities to increase teacher

professional development regarding ICT practices seem to be more effective when carried out as long-term programmes than isolated occasions.

This situation motivated me to apply a similar principle to the framework. Teachers' IRPs must draw on the interplay between three features (i.e., temporal, social, and spatial configuration) and reflexive layers or dimensions (i.e., professional, departmental, and institutional). Such interrelationships help different school members make explicit the tacit aspects underlying teachers' choices regarding their ICT practices. Some examples of such implicit areas are:

1. The pedagogical background of the ICT practice (e.g., TfU & PBL in the case of this school, although it could be any other in a different institutional ecosystem). This idea reveals different degrees of commitment to pedagogical frameworks and theories while developing ICT practices (from dialogic to collaborative and productive experiences, from teacher to student-centred practices). This issue reveals the pivotal figure of the HoD (or any other similar role in a different school ecosystem) as a bridge that catalyses the information existing in the institution to aid teachers in making conscious decisions regarding their ICT practices and, therefore, increasing agency.
2. The idea mentioned above implies that the teacher explicitly foresees and assesses the learning outcomes of the ICT practice. For instance, having weekly reflexive practice meetings allow teachers and HoDs to discuss what kind of learning they should encourage among students, what role does the teacher, the ICT and the pupils exert while developing their ICT practices.
3. The framework as an explicit CPD policy aims to increase teacher agency, understood as their capacity and opportunity to make autonomous and responsible decisions regarding their ICT practices. To ensure responsibility, they must account for the specificities of their school

ecosystem; therefore, they are required to acknowledge the three institutional reflexive dimensions when making every decision.

Freire (2014) summarises the ideas discussed in this section clearly:

...there isn't, then, a pedagogical situation without a subject who teaches, without a subject who learns, without a space-time within which these relationships take place, and there are no pedagogical situations without objects that can become known. However, the issue does not end here. There is another instance that is constitutive of the educative situation, something that goes beyond the educative situation and, nonetheless, is part of it. There is no educative situation that does not point to objectives lying beyond the classroom, that does not have to do with conceptions, ways of reading the world, aspirations, and utopias (pp. 20-21).

The quotation above justifies the contribution of the framework to knowledge in the field of educational technology because teachers must consider the features and dimensions that move beyond their classroom experiences and integrate them into their IRPs. Although Dewey's (1910) and Freire's (2011) notions have been widely used from the 20th century onwards, they have not been applied to teachers' ICT practices in the way I present in this section. In times where ICT have become crucial devices, resources, and services to connect the 'subject who teaches' with 'the subject who learns', teachers' conscious ICT practices meaningful to educators and learners remain underdeveloped (Crook, 2012; Ertmer & Ottenbreit-Leftwich 2010; Ertmer & Ottenbreit Leftwich, 2013; Lim et al., 2013; Ricoy & Sánchez-Martínez, 2019; Selwyn, et al., 2020; Tallvid, 2016). Such a reflexive activity should be continuous to enhance teachers' professional development, and, as a result, learners' common good (Ertmer & Ottenbreicht-Lefwitch, 2010; Tondeur et al., 2017; Turvey & Pachler, 2018).

2. The relevance of the framework to teacher professionalism

I have said before that teaching with ICT is becoming every day more significant to diverse areas of the education system. However, research still shows that teachers' ICT practices remain underdeveloped. Several scholars claim that teachers tend to use ICT to support existing and traditional practices, namely teacher-centered, rather than promoting diverse skills or kinds of learning that ICT can foster. For instance, Laurillard (2012) highlights six kinds of learning that teachers can promote through the development of their ICT practices (i.e., learning through acquisition, inquiry, discussion, production, practice, and collaboration). Research tends to show that teaching with ICT remains in the 'learning through acquisition' domain (Albion & Tondeur, 2018; Claro et al., 2013; Ertmer & Ottenbreit-Leftwich, 2012; Fariña, et al., 2015; Hinojosa et al., 2016). According to Laurillard (2012), although it is essential to promote all these kinds of learning, teachers must move beyond the transmission of knowledge to encourage complex tasks and allow students to apply and appropriate the content they acquire, construct and/or share, making it meaningful and authentic for them.

The Covid-19 crisis has shown the relevance of ICT for maintaining learning and teaching. However, simultaneously it has revealed that teachers have used them as 'emergency' resources (Lee et al., 2021; Lorenza & Carter, 2021; Whittle et al., 2020) without necessarily taking advantage of their potentials for collaborative, experiential, autonomous, among other sorts of learning.

The prevalence of diverse gaps that limit teachers' capacity of thinking and deciding how to develop their ICT practices is one of the primary reasons for this current problem in educational practice and research. I will focus on three of them relevant for my research. Firstly, I have identified a policy and practice gap (Lowyck, 2013; Williamson et al., 2020). In other words, national and institutional

policymakers tend to make decisions outside the teachers' and learners' micro-context (e.g., their classrooms). Therefore, they generate decontextualized expectations and judgments regarding teachers' ICT practices, while practitioners respond negatively to their requirements.

Besides, studies in the field have shown a theory and practice gap (Lowyck, 2013; Selwyn et al., 2020). Many theories can support ICT teaching practices. However, understanding teachers' pedagogical background while developing their ICT practices has been problematic. Even more, teachers' consciousness about the pedagogical theories sustaining their ICT use is still limited.

A third issue associated with teachers' ICT practices is the lack of consistent CPD suitable to the professionals' ecosystemic conditions (Michos et al., 2018; Scherer et al., 2020; Tondeur et al., 2016). I have argued before that the school constitutes an ecosystem with complex relational dynamics, norms, and regulations. On the one hand, the teacher must acknowledge such complexities. On the other hand, the ecosystem must provide teachers with CPD that focuses on technical aspects, pedagogical expertise, and areas specific to the disciplines they teach.

These three gaps demonstrate a lack of reflexive opportunities for teachers that help them assess their practices in a narrower sense (i.e., thinking personally about one classroom experience) and, most importantly, include the complexities of the school ecosystem and beyond.

The IRP framework I design in this thesis helps to reduce the gaps I have outlined before. Firstly, it combines the three reflexive dimensions (i.e., professional, departmental, and institutional) into teachers' ICT reflexive practices, helping to reduce the distance between policy and practice. Secondly, it helps the different agents involved in the school ecosystem to understand the teachers' rationales

for using ICT in teaching, allowing to reduce the distance between theory and practice. Thirdly, based on the promotion of constant dialogue and collaboration, it encourages sustainable CPD increasing holistic reflexivity about ICT and teacher agency, an issue that different scholars have arguably claimed (Albion & Tondeur, 2018; Michos et al., 2018; Philipson et al., 2019; Rodríguez-Valls, 2014; Tallvid, 2016). The cases I have provided in the thesis and the examples offered in this section clearly illustrate the worth of the framework to different educative contexts due to its flexibility and timely relevance.

3. Further research

a. Broadening the user-generated contexts/cases within the same ecosystem

This research has many areas of expansion. One of them is associated with increasing the number of cases operating inside the same school ecosystem. Considering that reflexive practice entails the institution's broader layers or dimensions, it is interesting to observe how the teacher participants of this thesis have been developing their IRPs over time and how other cases can be incorporated into the data set. It is also appealing to compare and contrast existing data with new information within the same cases by applying the IRP framework and investigating how their IRPs have changed since I developed the fieldwork. Between 2019 and today, a pandemic has massively disrupted our lives. Analysing the framework in the hybrid or entirely online context they have developed as an emergency response to the lockdowns is likewise exciting. How are teachers and the institution coping with the crisis? Are they using ICT as emergency resources, or have they kept refining their ICT practices, making them authentic? What new UGCs have been exciting or exemplary? How have the teachers' IRPs subsisted throughout the pandemic? What have been the primary challenges and strengths of the model during the crisis and beyond?

b. Broadening the ecosystems

The second area of further research I propose here is working with other school ecosystems. Reflexion involves the entire professional practice (Dewey, 1910; Freire, 2014): a permanent dialogue from the baseline to the top (and conversely). Therefore, applying the framework to different school ecosystems of the broader macrosystem containing them can offer a more holistic view of enhancing ICT practices over time.

Moreover, broadening the ecosystems could include different areas: a) initial teacher training; b) schoolteacher professional development; c) teacher educators; and d) academics who teach in other careers not related to education. My closest purpose aims to apply the IRP framework in the area of schoolteacher professional development. However, the framework is flexible enough to be used in any of the fields mentioned above.

4. Final conclusions

Investigating teachers' IRPs revealed three gaps that prevail today. Research has reported difficulties to determine real transformational ICT practices due to its context specific nature and variability. Also, national, and international studies show that teachers still use ICT to support conventional practices such as content delivery, which are more teacher-centred and dismiss the potential affordances technology can bring to pupils learning. Given this consideration, the first gap is associated with policy and practice: national and institutional policymakers generate decontextualised expectations, norms and regulations concerning teachers' ICT practices outside their teaching situation (e.g., their classroom experiences). On the other hand, teachers need support to understand and reveal the pedagogical theories underlying their ICT practices. The third gap is associated with the need of CPD provision to help teachers and institutions bridge the first two.

I studied how six cases developed their ICT reflexive practices (IRP) as a specific CPD policy established by their school ecosystem to bridge these three gaps. Following Freire's (2005, 2011, 2014) and Dewey's (1910, 1922) reflexive practice theories, the research design considered three reflexive dimensions:

1. Professional (I conducted one class observation per case).
2. Departmental (I carried out one reflexive practice meeting observation per case).
3. Institutional (I interviewed the cases' HoDs).

Drawing on a deductive approach primarily, I combined the RP notion with Dourish's (2004, 2009, 2016 & 2017) and Luckin's (2010, 2018; Luckin et al., 2011) concept of UGCs to produce an IRP framework.

Teaching with ICT involves complex interrelationships between space, place, time, people, resources and devices, among other features. The teacher's reflexive capacity to consider each of them carefully implies moving beyond a single learning and teaching experience with ICT. It entails thinking about features that usually are not visible. It involves transitioning from different material and immaterial frames that intertwine, generating unique contexts governed by specific relational dynamics and representational meanings (Dourish, 2017). In Luckin's (2018) view, while using ICT, the learner personalises the learning experience by generating a specific EoR, which is organised and reorganised permanently according to the user's agency. I applied these principles to the teacher as a professional learner of his/her ICT practice.

The framework constitutes an instrument supporting teachers, policymakers and other stakeholders involved in educators' CPD regarding their IRPs. It can help them assess the ICT practices by considering features beyond their direct experiences with pupils, such as the departmental and institutional dimensions. The framework also allows making sense of implicit aspects of the practice such

as time organisation, pupils-teachers-ICTs interaction within the learning situation, material, and immaterial resources interrelations to aid pupils learning, resources' distribution throughout the learning and teaching experience, or spatial configuration. This idea implies that each teacher -alongside his/her students- generates unique contexts while developing their ICT practices, which consider complex interrelationships that move beyond the physical boundaries of the classroom.

In the Covid-19 and even post-pandemic context, it will be crucial to understand how ICT practices are being carried out (Carrillo & Flores, 2020; Lee et al., 2021; Lorenza & Carter, 2021; Selwyn, et al., 2020; Williamson et al., 2020). Are teachers provided with high-quality and sufficient CPD to enhance their ICT practices? How are policymakers responding to the uncertainties generated by the pandemic?

Although the examples I reported in this thesis are limited, they provide meaningful ways in which teachers as designers of ICT practices generate authentic and meaningful learning experiences. As I have shown in the findings chapter, they afforded critical thinking, creativity, and collaborative problem-solving. Their IRP was pivotal for achieving such an outcome. The IRP framework I designed can help practitioners and policymakers make visible implicit areas that the teacher participants and HoDs did not acknowledge. For instance, the relationship between features (i.e., temporal, social, and spatial configuration), the recognition of non-conventional means for reflexion such as the Google Drive use, and how these tacit aspects relate to the broader macrosystem in which the school ecosystem is embedded.

Dewey's (1910, 1914, 1922, 1938) and Freire's (1998, 2005, 2011, 2014) development of reflexive practice enabled me to compare the data against their theories. As a result, I was able to elaborate a framework that stresses the

relevance of dialogue, teacher agency and the integration of the three reflexive dimensions. Such integration is pivotal to reducing the gaps between theory, policy and practice regarding teachers' ICT practices that have been reported by several scholars in the field of educational technology (Lowyck, 2013; OECD, 2009, Selwyn et al., 2020; Vanderblinde et al, 2012; Williamson et al, 2020). Freire (1998, 2005, 2011, 2014) relates to the main contribution of this thesis, that is, the IRP framework in the following ideas: liberatory practice through holistic reflexivity, criticality, and dialogic and collaborative teaching towards constant transformation and social liberation. Dewey (1910, 1914, 1922, 1938) has contributed to the framework with the emphasis on cognition towards deep consciousness of the practice through a systematic intellectual process subjected to the development of higher-order cognitive skills. As Freire, he suggests that this process must be understood as social and leads to democratic, participatory teaching. Both scholars allowed me to recognise agency as a result of reflexion. These approaches constituted the theoretical foundations for constructing the IRP framework, which I compared against the data and the notion of UGCs to include ICT in the composition.

The IRP framework supports teachers in their ICT reflexive practices, which several scholars have arguably requested (Michos et al., 2018; Philipson et al., 2019; Pynoo et al., 2011; Rodríguez-Valls, 2014). Moreover, the framework serves as a CPD model for schools and teachers to keep refining their decisions regarding ICT practices over time in a broader sense by integrating the three dimensions of the school ecosystem and even beyond (i.e., by combining the curriculum, pedagogy, national policies, among other aspects).

This thesis explicitly applies the notion of UGCs to teacher professionalism. The concept has commonly been referred to as the students' learning (Dourish, 2004, Dourish, 2017; Luckin, 2010; Luckin et al., 2011, Luckin, 2018). However, it is interesting to see how teachers, as learners of their profession, in collaboration

with pupils, colleagues, and policymakers, generate, through reflexion and agency, unique UGCs suitable for their teaching conditions.

In a world where ICT occupies a prominent role in education, enhancing teachers' reflexive capacity as an integral part of their professional learning is pivotal to ensuring meaningful ICT practices for them and their students. Following Freire's (2014) idea that learning and teaching are situated, and taking care of the gaps mentioned above, it will be essential to keep investigating how reflexion helps education professionals enhance their ICT practices over time, generate authentic contexts for them and their pupils by taking advantage of the potential learning affordances of ICT. The IRP which I have devised has a central part to play in the development of meaningful CPD which addresses the context as a learning ecosystem.

References

- Aguayo, C., Cochrane, T., & Narayan, V. (2019). Key themes in mobile learning: Prospects for learner-generated learning through AR and VR. *Australasian Journal of Educational Technology*. 33(6), 27-40. <https://doi.org/10.14742/ajet.3671>
- Albarelo, F., Novoa, A., Castro, M., Velasco, A., Novaro, M. V., & Narbais, F. (2021). The social dynamics of multiplayer online videogames in Argentinian and Chilean family contexts: The case of Fortnite. *Global Studies of Childhood*. 11(4), 302-317. <https://doi.org/10.1177/20436106211015997>
- Albion, P.R., & Tondeur, J. (2018). Information and Communication Technology and Education: Meaningful Change through Teacher Agency. In: Voogt, J., Knezek, G., Christensen, R., & Lai, K-W. (eds). *Second Handbook of Information Technology in Primary and Secondary Education Springer International Handbooks of Education*. 1-16. https://doi.org/10.1007/978-3-319-53803-7_25-1
- Anders, A.D. (2018). Networked learning with professionals boosts students' self-efficacy for social networking and professional development. *Computers & Education*. 127, 13-29. <https://doi.org/10.1016/j.compedu.2018.08.009>
- Auerbach, J.E., Concordel, A., Kornatowski, P. M., & Floreano, D. (2019). Inquiry-Based Learning With RoboGen: An Open-Source Software and Hardware Platform for Robotics and Artificial Intelligence. *IEEE Transactions on Learning Technologies*. 12(3), 356-369. <https://doi.org/10.1109/TLT.2018.2833111>
- Bachmair, B. (2017). Digital, individualized mobile devices as cultural resources for learning in the process of migration. *Media Education*. 2. 170-186. <https://cyberleninka.ru/article/n/media-culture-digital-individualized->

[mobile-devices-as-cultural-resources-for-learning-in-the-process-of-migration](#)

- Bachmair, B., Turvey, K., Cook, J., & Pachler, N. (2018). Learning analytics and its metrics – approaching an educational frame via a social semiotic pathway. *Medienimpulse*. 56(3), 1-36. <https://journals.univie.ac.at/index.php/mp/article/view/mi1214>
- Bachmair, B., & Pachler, N. (2014). A cultural ecological frame for mobility and learning. *Medien Pädagogik*. 24, 53–74. <https://doi.org/10.21240/mpaed/24/2014.09.04.X>
- Bano, M., Zowghi, D., Kearney, M., Schuck, S., & Aubusson, P. (2018). Mobile learning for science and mathematics school education: A systematic review of empirical evidence. *Computers & Education*. 121, 30-58. <https://doi.org/10.1016/j.compedu.2018.02.006>
- Barthes, R. (1977). *Image–Music–Text*. London: Fontana Books.
- Beazley, M., McLeod, J., & Lin., L. (2008). Pedagogical principles, problems, and possibilities in online global classrooms. In Voogt, J. & Knezeck, G. (eds). *Technology in Primary and Secondary Education*. New York: Springer. 675-693
- Benade, L. (2015). Teachers' Critical Reflective Practice in the Context of Twenty-first Century Learning. *Open Review of Educational Research*. 2(1), 42-54. <https://doi.org.10.1080/23265507.2014.998159>
- BERA (2018). *Ethical Guidelines for Educational Research*. London: BERA. <https://www.bera.ac.uk/researchersresources/publications/ethical-guidelines-for-educational-research-2018>
- Berland, M., Davis, D., & Petrick Smith, C. (2015). AMOEBA: Designing for collaboration in computer science classrooms through live learning analytics. *International Journal of Computer-Supported Collaborative Learning*. 10, 425-447. <https://doi.org/10.1007/s11412-015-9217-z>

- Bezemer, J., & Kress, G. (2008). Writing in Multimodal Texts: A Social Semiotic Account of Designs for Learning. *Written Communication*. 25(2), 166-195. <https://doi.org/10.1177/0741088307313177>
- Bezemer, J., & Kress, G. (2016). *Multimodality, learning and communication. A Social Semiotic Frame*. Abingdon: Routledge
- Biesta, G., Priestley, M., & Robinson, S. (2015) The role of beliefs in teacher agency. *Teachers and Teaching*. 21(6), 624-640. <https://doi.org/10.1080/13540602.2015.1044325>
- Biggs, J. (2005). *Calidad del Aprendizaje Universitario*. Madrid, España: Narcea.
- Biggs, J., & Tang, C. (2011) *Teaching for Quality Learning at University. What the student does*. New York: McGraw Hill
- Bleakley, A. (1999). From reflective practice to holistic reflexivity. *Studies in Higher Education*. 24(3), 315-330 <https://doi.org/10.1080/03075079912331379925>
- Bogdan, R., & Biklen S. (2006) *Qualitative Research for Education. An Introduction to Theories and Methods*. Boston: Pearson.
- Bolton, G. (2010). *Reflective Practice. Writing and Professional Development*. Los Angeles: Sage.
- Bond, M. (2020). Facilitating student engagement through the flipped learning approach in K-12: A systematic review. *Computers & Education*. 151, 1-35. <https://doi.org/10.1016/j.compedu.2020.103819>
- Bond, M., Zawaki-Richter, O., & Nichols, M. (2019). Revisiting five decades of educational technology research: A content and authorship analysis of the British Journal of Educational Technology. *British Journal of Educational Technology*. 50(1), 12-63. <https://doi.org/10.1111/bjet.12730>
- Boyatzis, R.E. (1998). *Transforming qualitative information: thematic analysis and code development*. Thousand Oaks, California; London: Sage.

- Braun, V., & Clarke, V. (2019). Reflecting on Reflexive Thematic Analysis. *Qualitative Research in Sport, Exercise and Health*. 11(4), 589-597, <https://doi.org/10.1080/2159676X.2019.1628806>
- Briscoe, P. (2017). Using a Critical Reflection Framework and Collaborative Thinking Inquiry to Improve Teaching Practice: An Action Research Project. *Canadian Journal of Action Research*. 18(2), 43-61. <https://journals.nipissingu.ca/index.php/cjar/article/view/334>
- Broadbendt, J. (2017). Comparing online and blended learner's self-regulated learning strategies and academic performance. *Internet and Higher Education*. 33, 24-32. <http://dx.doi.org/10.1016/j.iheduc.2017.01.004>
- Brookfield, S. (1988). Critically Reflective Practice. *Journal of Continuing Education in the Health Professions*. 18 (4), 197-205. <https://doi.org/10.1002/chp.1340180402>
- Bryman, A. (2012). *Social Research Methods*. Oxford and New York: Oxford University Press.
- Burgess, H., Sieminsky, S., & Arthur, L. (2006). *Achieving Your Doctorate in Education*. London: Sage.
- Callaghan, N. (2016). Investigating the role of Minecraft in educational learning environments. *Educational Media International*. 53(4), 244-260. <https://doi.org/10.1080/09523987.2016.1254877>
- Carrillo, C., & Flores, M.A. (2020). COVID-19 and teacher education: a literature review of online teaching and learning practices. *European Journal of Teacher Education*. 43(4), 466-487. <https://doi.org/10.1080/02619768.2020.1821184>
- Chanpet, P., Chomsuwan, K., & Murphy, E. (2018). Online Project-Based Learning and Formative Assessment. *Technology, Knowledge and Learning*. 25, 685-705. <https://doi.org/10.1007/s10758-018-9363-2>
- Charbonneau-Gowdy, P. (2015). It Takes a Community to Develop a Teacher: Testing a New Teacher Education Model for Promoting ICT in Classroom

- Teaching Practices in Chile. *The Electronic Journal of e-Learning*. 13(4), 237-249. <https://eric.ed.gov/?id=EJ1062120>
- Claro, M. (2010). *La incorporación de tecnologías digitales en educación. Modelos de identificación de buenas prácticas*. Santiago, Chile: UN
- Claro, M., Nussbaum, M., López., X., & Díaz, A. (2013). Introducing 1 to 1 in the Classroom: A Large-scale Experience in Chile. *Educational Technology & Society*. 16 (3), 315–328. <https://www.jstor.org/stable/jeductechsoci.16.3.315>
- Claro, M., Salinas, A., Cabello-Hut, C., San Martín, E., Preiss, D., Valenzuela, S., & Jara, I. (2018). Teaching in a Digital Environment (TIDE): Defining and measuring teachers' capacity to develop students' digital information and communication skills. *Computers & Education*, 121. 162-174. <https://doi.org/10.1016/j.compedu.2018.03.001>
- Claro, M., & Jara, I. (2020). The end of Enlaces: 25 years of an ICT education policy in Chile. *Digital Education Review*. 27, 96-108. <https://revistes.ub.edu/index.php/der/article/view/30669/pdf>
- Cole, A. (1997). Impediments to Reflective Practice: toward a new agenda for research on teaching. *Teachers and Teaching. Theory and Practice*. 3(1), 7-27 <https://doi.org/10.1080/1354060970030102>
- Cole, A., & Knowles, G. (1998). Teacher Development Partnership Research: A Focus on Methods and Issues. *American Educational Research Journal*, 30(3), 473-495. <https://doi.org/10.3102/00028312030003473>
- Coll, C., Onrubia, J., & Mauri, T. (2007). Tecnología y prácticas pedagógicas: las TIC como instrumentos de mediación de la actividad conjunta de profesores y estudiantes. *Anuario de Psicología*. 38(3). 377-400. <https://revistes.ub.edu/index.php/Anuario-psicologia/article/view/8407>
- Cook., V., Warwick., P., Vrikki, M., Major, L., & Wegerif, R. (2019). Developing material-dialogic space in geography learning and teaching: Combining a dialogic pedagogy with the use of a microblogging tool. *Thinking skills and creativity*. 31. 217-231. <https://doi.org/10.1016/j.tsc.2018.12.005>

- Copeland, W.D., Birmingham, C., De la Cruz, E., & Lewin, B. (1993). The reflective practitioner in teaching: toward a research agenda. *Teaching & Teacher Education*. 9(4), 347-359. [https://doi.org/10.1016/0742-051X\(93\)90002-X](https://doi.org/10.1016/0742-051X(93)90002-X)
- Cordero, K., Nussbaum, M., Ibaseta, V., Otaiza, M.J., Gleisner, S., González, S., Rodríguez-Montero, W. Strasser, K., Verdugo, R., Ugarte, A., Chiuminatto, P., & Carland, C. (2015). Read Create Share (RCS): A new digital tool for interactive reading and writing. *Computers & Education*. 486-496. <https://doi.org/10.1016/j.compedu.2014.12.006>
- Cornelius, S., & Shanks, R. (2017). Expectations and challenges: the implementation of mobile devices in a Scottish primary school. *Educational Technology, Pedagogy and Education*. 26(1). 19-31. <https://doi.org/10.1080/1475939X.2016.1153513>
- Cox, M. (2014). The impact of technology on teaching and learning: lessons from research. In Leask, M., & Pachler, N. *Learning to teach with ICT in the secondary school. A companion to School Experience*. Oxon: Routledge, 18-39
- Craig, C. (2010). Coming full circle: from teacher reflection to classroom action and places in-between. *Teachers and Teaching: theory and practice*. 16(4) 423-435. <https://doi.org/10.1080/13540601003754814>
- Creswell, J. (2013). *Qualitative Inquiry and Research Design*. Los Angeles, London, New Delhi: Sage
- Crompton, H., Burke, D., Jordan, K., & Wilson, S.W.G. (2021). Learning with technology during emergencies: A systematic review of K-12 education. *British Journal of Educational Technology*. 1554-1575. <https://doi.org/10.1111/bjet.13114>
- Crook, C. (2008). *Web 2.0 technologies for learning: The current landscape – opportunities, challenges and tensions*. London: BECTA. <http://www.becta.org.uk>

- Crook, C., Harrison, C., Farrington-Flint, L., Tomas, C., & Underwood, J. (2010). *The impact of technology: value added classroom practice*. London: BECTA. <http://www.becta.org.uk>
- Crook, C. (2012). The 'digital native' in context: tensions associated with importing Web 2.0 practices into the school setting, *Oxford Review of Education*. 38(1), 63-80. <http://dx.doi.org/10.1080/03054985.2011.577946>
- Crook, C. (2015). The Field of Digital Technology Research. In Price, S, Jewitt, C & Brown, B. *The SAGE Handbook of Digital Technology Research*. London: Sage Publications, 26-40
- Crowe, N., & Flynn, S. (2014). Hunting down the monster: using multi-play digital games and online virtual worlds in secondary school teaching. In Leask, M., & Pachler, N. *Learning to teach with ICT in the secondary school. A companion to School Experience*. Oxon: Routledge. 133-145
- Cukurova, M., & Luckin, R. (2018). What the Research Says About the Use of Different Technologies to Enhance Learning. In Luckin, R. (ed). *Enhancing learning and teaching with technology. What the research says*. London: UCL Institute of Education Press. 34-45
- Damşa, C., Langford, M., Uehara, D., & Scherer, R. (2021). Teachers' agency and online education in times of crisis. *Computers in Human Behavior*. 121, 1-16. <https://doi.org/10.1016/j.chb.2021.106793>
- Day, C. (1999). Professional development and reflective practice: purposes, processes and partnerships. *Pedagogy, Culture & Society*. 7(2), 221-233. <https://doi.org/10.1080/14681366.1999.11090864>
- Davis, N. (1997). Strategies for staff and institutional development for IT in education: an integrated approach. In Somekh, B. & Davis, N. (eds.) *Using Information Technology effectively in Teaching and Learning: Studies in Pre-Service and In-Service Teacher Education*. London: Routledge. 253-268.

- Davies, P. (2018). Learning with iPads: 'Makes Learning Fun'. In Luckin, R., (ed). *Enhancing learning and teaching with technology. What the research says*. London: UCL Institute of Education Press, 81-87
- Dede, C. (2008). Theoretical perspectives influencing the use of information technology in teaching and learning. In, Voogt, J., & Knezek, G. *International Handbook of Information Technology in Primary and Secondary Education*. New York: Springer. 43-62.
- Dewey, J. (1910). *How we think*. Lexington, MA, US: D C Heath.
<http://dx.doi.org/10.1037/10903-000>
- Dewey, J. (1914). *Ethics*. NY, US: Henry Holt and Company.
<http://dx.doi.org/10.1037/13641-000>
- Dewey, J. (1922). *Human nature and conduct: An introduction to social psychology*. NY, US: Henry Holt and Company.
<http://dx.doi.org/10.1037/14663-000>
- Dewey, J. (1960). Psychology and social practice. *Science, New Series*. 11(270), 105-124. <https://doi.org/10.1037/h0066152>
- Dewey, J. (2001). The educational situation: as concerns the elementary school. *Journal of Curriculum Studies*. 33(4), 387-403.
<https://www.doi.org/10.1080/00220270010023803>
- Dewey, J. (2010). The need for a philosophy of education (1934). *Schools: Studies in Education*. 7(2), 244-245. <https://doi.org/10.1086/656072>
- Dewey, J. (2012). Education and democracy in the world of today (1938). *Schools: Studies in Education*. 9(1), 96-100.
<https://doi.org/10.1086/665026>
- Diga, K., & May, J. (2016). The ICT ecosystem: The application, usefulness, and future of an evolving concept. *Information Technology for Development*. 22(1), 1-6,
<https://doi.org/10.1080/02681102.2016.1168218>
- Dinsmore, B. (2019). Contested affordances: teachers and students negotiating the classroom integration of mobile technology. *Information.*

- Communication & Society*. 22(5). 664-677.
<https://doi.org/10.1080/1369118X.2019.1568518>
- Dourish, P. (2004). What We Talk About When We Talk About Context. *Personal and Ubiquitous Computing*. 8, 19–30.
<https://doi.org/10.1007/s00779-003-0253-8>
- Dourish, P. (2009). Seeking a Foundation for Context-Aware Computing. *Human–Computer Interaction*, 16 (2-4), 229-241.
https://doi.org/10.1207/S15327051HCI16234_07
- Dourish, P. (2016). Algorithms and their others: Algorithmic culture in context. *Big Data & Society*. 1-11 <https://doi.org/10.1177/2053951716665128>
- Dourish, P. (2017). *The stuff of bits. An Essay on the Materialities of Information*. Cambridge, Massachusetts and London, England: MIT Press
- Ely, M. (2003). *Doing qualitative research: circles within circles*. London and Philadelphia: Taylor & Francis.
- Erstad, O. (2002). Norwegian students using digital artifacts in project-based learning. *Journal of Computer Assisted Learning*. 18, 427-437.
<https://doi.org/10.1046/j.0266-4909.2002.00254.x>
- Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*. 53(4), 25-39. <https://doi.org/10.1007/BF02504683>
- Ertmer, P. A., & Ottenbreit-Lefwitch, A.T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*. 42(3), 255-284,
<https://doi.org/10.1080/15391523.2010.10782551>
- Ertmer, P. A., Ottenbreit-Lefwitch, A T., Sadik, O., Sendurur, E., & Sendurur, P. (2012) Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*. 59, 423-435.
<https://doi.org/10.1016/j.compedu.2012.02.001>
- Ertmer, P. A., & Ottenbreit-Leftwich, T.A. (2013). Removing obstacles to the pedagogical changes required by Jonassen’s vision of authentic

- technology-enabled learning. *Computers & Education*. 64, 165-182.
<https://doi.org/10.1016/j.compedu.2012.10.008>
- Fariña, P., San Martín, E., Preiss, D. D., Claro, M., & Jara, I. (2015). Measuring the relation between computer use and reading literacy in the presence of endogeneity. *Computers & Education*. 80, 176-186.
<http://dx.doi.org/10.1016/j.compedu.2014.08.010>
- Fairclough, N. (1989) *Language and Power*, Harlow, Longman. Discourse and Social Change. Cambridge: Polity Press.
- Farrel, T.C. (2011). 'Keeping SCORE': Reflective Practice Through Classroom Observation. *RELC Journal*. 42(3), 265-272.
<https://doi.org/10.1177%2F0033688211419396>
- Farrimond, H. (2017). The Ethics of Research. In: Wyse, D., Selwyn, N., Smyth, E., & Sutter, L.E. *The BERA/SAGE Handbook of Educational Research*. London: Sage. 72-89. <http://dx.doi.org/10.4135/9781473983953.n4>
- Fisher, T., Higgins, C., & Loveless, A. (2006). *Teachers learning with digital technologies: A review of Research and Projects*. Bristol: Futurelab
- Fox, K., Campbell, M., & Hargove, T. (2011). Examining Reflective Practice: Insights from Pre-service Teachers, In-service Teachers and Faculty. *Journal of Research in Education*. 21(2).
<https://files.eric.ed.gov/fulltext/EJ1098417.pdf>
- Foucault, M. (1982) *The Archaeology of Knowledge and Discourse on Language*. London: Tavistock Press.
- Freire, P. (1998). *Pedagogy of Freedom: Ethics, Democracy and Civic Courage*. Lanham, Boulder, New York, Oxford: Rowman & Littlefield Publishers.
- Freire, P. (2005). *Pedagogy of indignation*. New York: Routledge.
- Freire, P. (2011). *Pedagogía de la autonomía. Saberes necesarios para la práctica Educativa*. Buenos Aires: Siglo XXI
- Freire, P. (2014). *Pedagogy of commitment*. New York: Routledge.
<https://doi.org/10.4324/9781315632919>

- Freire, P., & Nogueira, A. (1989). *Que fazer. Teoria em prática em educação popular*. Petrópolis: Editora Vozes
- Freire, P., & Shor, I. (2014). *Miedo y osadía. La cotidianidad del docente que se arriesga a practicar una pedagogía transformadora*. Buenos Aires: Siglo XXI
- Fullan, M., & Langworthy, M. (2014). *A rich seam: How new pedagogies find deep learning*. London: Pearson. https://www.michaelfullan.ca/wp-content/uploads/2014/01/3897.Rich_Seam_web.pdf
- Geer, R., White, B., Zeegers, Y., Wing A., & Barnes, A. (2017). Emerging pedagogies for the use of iPads in schools. *British Journal of Educational Technology*. 48(2). 490-498. <https://doi.org/10.1111/bjet.12381>
- Gibson, W., & Brown, A. (2009). *Working with Qualitative Data*. London, UK: SAGE
- Glenn, M. (2011). Developing holistic practice through reflection, action and theorising. *Educational Action Research*. 19(4) 489-502. <https://doi.org/10.1080/09650792.2011.625694>
- Greenhow, C., & Askari, E. (2015). Learning and teaching with social network sites: A decade of research in K-12 related education. *Education and Information Technologies*. 50(1), 623-645. <https://doi.org/10.1007/s10639-015-9446-9>
- Grbich, C. (2013). *Qualitative Data Analysis*. London: Sage.
- Goldenberg, P. (1997). Multiple Representations: A Vehicle for Understanding. In Perkins, D.N. Schwartz, J., Maxwell West, M., Stone Wiske, M. *Software Goes to School: Teaching for Understanding with New Technologies*. New York: Oxford University Press.
- González, A., Fernández, M.B., Pino-Yancovic, M., & Madrid, R. (2020). Teaching in the pandemic: reconceptualizing Chilean educators' professionalism now and for the future. *Journal of Professional Capital and Community*. 5(3/4), 265-272. <https://doi.org/10.1108/JPCC-06-2020-0043>

- Gore, J. (2020). Why Isn't This Empowering? The Discursive Positioning of Teachers in Efforts to Improve Teaching. In Brown, A., & Wisby, E. (eds). *Knowledge, Policy and Practice in Education and the Struggle for Social Justice. Essays Inspired by the Work of Geoff Whitty*. London: UCL Press. 199-216. <https://doi.org/10.14324/111.9781782772774>
- Gore, J.M., & Zeichner, K.M. (1991). Action research and reflective practice teaching in preservice teacher education: a case study from the United States. *Teaching & Teacher Education*. 7(2), 119-136. [https://doi.org/10.1016/0742-051X\(91\)90022-H](https://doi.org/10.1016/0742-051X(91)90022-H)
- Guba, E.G., & Lincoln, Y.S. (1994). Paradigmatic Controversies, Contradictions, and Emerging Confluences. In: Denzin, N.K., & Lincoln, Y. S. (eds). *The Sage Handbook of Qualitative Research*. Thousand Oaks, London, and New Delhi: Sage. 191-216.
- Guest, G., McQueen, K.M., & Namey, E.E. (2012). *Applied Thematic Analysis*. Thousand Oaks: Sage. <https://dx.doi.org/10.4135/9781483384436>
- Hanney, R. & Skirkeviciutey, G. (2019). Reflection Identity Community: Affordances Blogging Social Interaction. *Education and Information technology*. 25, 1553-1569. <https://doi.org/10.1007/s10639-019-10030-4>
- Hennessy, S. (2012). Using the interactive whiteboard to support dialogue in the whole class. In Leask, M., & Pachler, N. *Learning to teach with ICT in the secondary school. A companion to School Experience*. Oxon: Routledge, 100-119
- Hepp, P., Laval, E., Moëne, G., & Ripoll, M. (1996). Monitoring the 'Enlaces' educational computer network. *Education and Information Technologies*. 1, 5-20. <https://link.springer.com/content/pdf/10.1007/BF00144333.pdf>
- Hernández-Sellés, N., Muñoz-Carril P-C., & González Sanmamed, M. (2019). Computer Supported Collaborative Learning – An Analysis of the relationship between interaction, emotional support and online collaborative tools. *Computers & Education*. 138, 1-12. <https://doi.org/10.1016/j.compedu.2019.04.012>

- Hinostroza, J., Guzmán, A., & Isaacs, S. (2002). Innovative uses of ICT in Chilean schools. *Journal of Computer Assisted Learning*. 18, 459-469. <https://doi.org/10.1046/j.0266-4909.2002.00257.doc.x>
- Hinostroza, J. E., Labbé, C., Brun, M., & Matamala, C. (2011). Teaching and learning activities in Chilean classrooms: Is ICT making a difference? *Computers & Education*. 57(1), 1358-1367. <https://doi.org/10.1016/j.compedu.2011.01.019>
- Hinostroza, J. E., Ibieta, A., Claro, M., & Labbé, C. (2016). Characterisation of teachers' use of computers and Internet inside and outside the classroom: The need to focus on the quality. *Education and Information Technology*. 21, 1595-1610. <https://doi.org/10.1007/s10639-015-9404-6>
- Hougan, E., Johnson, H., Novak, D., Foote, C., & Palmery, A. (2018). Exploring the Influence of Accomplished Teachers' Video and Commentary Pairing on Teacher Candidates' Noticing and Thinking about Practice. *Journal of Technology and Teacher Education*. 26(2), 217-248. <https://www.learntechlib.org/primary/p/182210/>
- Howard, S.K., Tondeur, J., Siddiq, F., & Scherer, R. (2021). Ready, set, go! Profiling teachers' readiness for online teaching in Secondary Education. *Technology, Pedagogy and Education*. 30(19). 141-158. <https://doi.org/10.1080/1475939X.2020.1839543>
- Hunsaker, L., & Johnston, M. (1992). Teacher under Construction: A Collaborative Case Study of Teacher Change. *American Educational Research Journal*. 29(2), 350-372. <https://doi.org/10.2307/1163372>
- Ibieta, A., Hinostroza, J.E., Labbé, C., & Claro, M. (2017) The role of the Internet in teachers' professional practice: activities and factors associated with teacher use of ICT inside and outside the classroom. *Technology, Pedagogy and Education*. 26(4), 425-438. <https://doi.org/10.1080/1475939X.2017.1296489>
- Jara, I., Claro, M., Hinostroza, J.E., San Martín, E., Rodríguez, P., Cabello, T., Ibieta, A., & Labbé, C. (2015). Understanding factors related to Chilean

- students' digital skills: A mixed methods analysis. *Computers & Education*. 88, 387-398. <https://doi.org/10.1016/j.compedu.2015.07.016>
- Jaramillo, C., & Chávez, J. (2015). TIC y educación en Chile: Una revisión sistemática de la literatura. *Nuevas Ideas en Informática Educativa*. <http://www.tise.cl/volumen11/TISE2015/221-231.pdf>
- Jay, J.K. (1999). Untying the Knots: Examining the Complexities of Reflective Practice. [Conference Presentation], Annual Meeting of the American Association of Colleges for Teacher Education, Washington, DC.
- John, P., & Sutherland, R. (2006). Affordance, opportunity and the pedagogical implications of ICT. *Educational Review*. 57(4), 405-413. <https://doi.org/10.1080/00131910500278256>
- Jonassen, D. H. (2000). Revisiting activity theory as a framework for designing student-centered learning environments. In Jonassen, D. H., & Land, S. M. (Eds.), *Theoretical foundations of learning environments* (89-121). Mahwah, NJ: Lawrence Erlbaum.
- Jones, M., & Charteris, J. (2017). Transformative professional learning: an ecological approach to agency through critical reflection. *International and Multidisciplinary Perspectives*. 18(4). 496-513. <https://doi.org/10.1080/14623943.2017.1307729>
- Jones, S., & Younie, S. (2014). ICT Tools for Professional development. In Pachler, N. & Leask, M. (eds). *Learning to teach using ICT in the Secondary School. A Companion to School Experience*. Oxon: Routledge, 40-54.
- Joo-Nogata, J., Martínez-Abad, F., García-Bermejo Giner, J., & García-Peñalvo, F.J. (2017). Augmented Reality and Pedestrian Navigation through its implementation in m-learning and e-learning: Evaluation of an educational program in Chile. *Computers & Education*. 111, 1-17. <https://doi.org/10.1016/j.compedu.2017.04.003>

- Jouneau-Sion, C., & Sanchez, E. (2013). Preparing schools to accommodate the challenge of Web 2.0 technologies. *Education and Information Technologies*. 18, 265-270. <https://doi.org/10.1007/s10639-012-9225-9>
- Kassner, L.D., & Cassada, K.M. (2017). Chat It Up: Backchanneling to Promote Reflective Practice Among In-Service Teachers. *Journal of Digital Learning in Teacher Education*. 33(4), 160-158. <https://doi.org/10.1080/21532974.2017.1357512>
- Kemp, A., Palmer, E., & Strelan P. (2019). A taxonomy of factors affecting attitudes towards educational technologies for use with technology acceptance models. *British Journal of Educational Technology*, 50(5), 2394-2413. <https://doi.org/10.1111/bjet.12833>
- Kizilcec, R.F., Pérez-Sanagustín, M., & Maldonado, J.J. (2017). Self-regulated learning strategies predict learner behavior and goal attainment in Massive Open Online Courses. *Computers & Education*. 104, 18-33. <http://dx.doi.org/10.1016/j.compedu.2016.10.001>
- Klašnja-Milićević, A., & Ivanović, M. (2018). Learning Analytics – New Flavor and Benefits for Educational Environments. *Informatics in Education*. 17(2), 285-300. <https://doi.org/10.15388/infedu.2018.15>
- Koehler, M.J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*. 9(1), 60-70. <https://citejournal.org/volume-9/issue-1-09/general/what-is-technological-pedagogicalcontent-knowledge>
- Koehler, M.J., Mishra, P., & Cain, W. (2013). What Is Technological Pedagogical Content Knowledge (TPACK)? *The Journal of Education*. 193(3), 13-19. <https://www.jstor.org/stable/24636917>
- Koerber, A., & McMichael, L. (2008). Qualitative Sampling Methods. A Primer for Technical Communicators. *Journal of Business and Technical Communication*. 22(4), 454-473. <https://doi.org/10.1177/1050651908320362>

- Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-Based Learning: A review of the literature. *Improving Schools*. 19(3), 267-277. <https://doi.org/10.1177/1365480216659733>
- Korhonen, A-M., Ruhalhti, S., & Veermans, S. (2019). The online learning process and scaffolding in student teachers' personal learning environments. *Education and Information Technologies*. 24, 755-779. <https://doi.org/10.1007/s10639-018-9793-4>
- Kozma, R. (2003). Technology and classroom practices: An international study. *Journal of Research on Technology in Education*. 36(1), 1-14. <https://doi.org/10.1080/15391523.2003.10782399>
- Kozma, R., & Vota, W.S. (2014). ICT in Developing countries: policies, implementation, and impact. In Spector J., Merrill M., Elen J., Bishop M. (eds). *Handbook of Research on Educational Communications and Technology*. New York: Springer, 885-894. https://doi.org/10.1007/978-1-4614-3185-5_72
- Kress, G. (2010). *Multimodality A social semiotic approach to contemporary communication*. Oxon: Routledge.
- Kress, G., & Selander, S. (2012). Multimodal design, learning and cultures of recognition. *The Internet and Higher Education*. 15(4). 265–268. <http://dx.doi.org/10.1016/j.iheduc.2011.12.003>
- Laurillard, D. (2007). Technology, pedagogy and education: concluding comments. *Technology, Pedagogy and Education*. 16 (3), 357-360, <https://doi.org/10.1080/14759390701614496>
- Laurillard, D. (2012). *Teaching as a design science. Building pedagogical patterns for learning and technology*. New York: Routledge
- Laurillard, D. (2016). Learning number sense through digital games with intrinsic feedback. *Australasian Journal of Educational Technology*. 32(6), 32-44. <https://doi.org/10.14742/ajet.3116>
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

- Lavonen, J., Krzwacki, H., Koistinen, L., Welzel-Breuer, M., & Erb, R. (2012). In-service teacher education course module design focusing on usability of ICT applications in science education. *Nordina*. 8(2), 138-149. <http://dx.doi.org/10.5617/nordina.523>
- Lee, J., Solemaini, F., & Harmon, S.W. (2021). Emergency Move to Remote Teaching: A Mixed Method Approach to Understand Faculty Perceptions and Instructional Practices. *American Journal of Distance Education*. 1-17. <https://doi.org/10.1080/08923647.2021.1980705>
- Lim, C.-P., Zhao, Y., Tondeur, J., Chai, C.-S., & Tsai, C.-C. (2013). Bridging the Gap: Technology Trends and Use of Technology in Schools. *Educational Technology & Society*, 16 (2), 59–68. <https://www.jstor.org/stable/jeductechsoci.16.2.59>
- Liston, D.P., & Zeichner, K.M. (1990). Reflective Teaching and Action Research in Preservice Teacher Education. *International research and pedagogy*. 16(3). 235-254. <https://doi.org/10.1080/0260747900160304>
- Liu, Q., & Chao, C. (2018). CALL from an ecological perspective: How a teacher perceives affordance and fosters learner agency in a technology-mediated language classroom. *ReCALL: The Journal of EUROCALL*. 30(1). 68-87. <https://doi.org/10.1017/S0958344017000222>
- Livingstone, S. (2012). Critical reflections on the benefits of ICT in education. *Oxford Review of Education*. 38(1), 9-24, <http://dx.doi.org/10.1080/03054985.2011.577938>
- Llorens, A., Berbegal-Mirabent, J., & Llinàs-Audet, X. (2017). Aligning professional skills and active learning methods: an application for information and communications technology engineering. *European Journal of Engineering Education*, 24(4), 382-395, <https://doi.org/10.1080/03043797.2016.1189880>
- Lorenza, L., & Carter, D. (2021). Emergency online teaching during COVID-19: A case study of Australian tertiary students in teacher education and

- creative arts. *International Journal of Educational Research Open*. 2(2). 1-8. <https://doi.org/10.1016/j.ijedro.2021.100057>
- Loughran, J. (2002). Effective Reflective Practice: In Search of Meaning in Learning about Teaching. *Journal of Teacher Education*. 53 (33), 33-43. <https://doi.org/10.1177/0022487102053001004>
- Loveless, A., & Williamson, B. (2013). *Learning Identities in a Digital Age: Rethinking creativity, education and technology*. New York: Routledge.
- Lowyck, J. (2013). Bridging learning theories and technology enhanced learning environments. In Spector, M., Merrill, D., Ellen, M., & Bishop, M.J. (eds). *Handbook of research on educational communications and technology*. New York, Heidelberg, Dordrecht and London: Springer, 3-20
- Lørke Weitze, C. (2018). Using game design for learning. In Luckin, R. (ed). *Enhancing learning and teaching with technology. What the research says*. London: UCL Institute of Education Press, 54-63
- Luckin, R. (2010). *Re-designing Learning Contexts: Technology-rich, learner-centred ecologies*. London: Routledge. <https://doi.org/10.4324/9780203854754>
- Luckin, R., Clark, W., Garnett, F., Withworth, A., Akass, J., Cook, J., Day, P., Ecclesfield, N., Hamilton, T., & Robertson, J. (2011). Learner Generated Contexts: a framework to support the effective use of technology to support learning. In: Lee, M., & McLoughlin, C. (eds.). *Web 2.0-Based E-Learning: Applying Social Informatics for Tertiary Teaching*. Hershey & New York: IGI Global: 70-84. <https://doi.org/10.4018/978-1-60566-294-7.ch004>
- Luckin, R. (2018) (ed). *Enhancing learning and teaching with technology. What the research says*. London: UCL Institute of Education Press.
- Luckin, R., & Weatherby, K. (2018). Learning Analytics, Artificial Intelligence and the Process of Assessment. In Luckin, R. (ed). *Enhancing learning and teaching with technology. What the research says*. London: UCL Institute of Education Press, 243-255.

- Luckin, R., & Cukurova, M. (2019). Designing educational technologies in the age of AI: A learning sciences-driven approach. *British Journal of Educational Technology*, 50(6), 2824-2838. <https://doi.org/10.1111/bjet.12861>
- Maguire, M., & Delahunt, B. (2017). Doing a Thematic Analysis: A Practical, Step-by-Step Guide for Learning and Teaching Scholars. *All Ireland journal of teaching and learning in higher education*, 3, 3351-3354. <http://ojs.aishe.org/index.php/aishe-j/article/view/335>
- Maher, D., & Schuck, S. (2020). Using action learning to support mobile pedagogies: the role of facilitation. *Teacher Development*, 24 (4), 520-538. <https://doi.org/10.1080/13664530.2020.1797864>
- Markham, M. (1999). Through the Looking Glass: Reflective Teaching through a Lacanian Lens. *Curriculum Inquiry*, 29(1), 55-76. www.jstor.org/stable/3185901
- Mathew, N.G. (2012). Reflective Classroom Practice for Effective Classroom Instruction. *International Education Studies* 5(3), 205-211. <http://dx.doi.org/10.5539/ies.v5n3p205>
- McFeetors, P.J. (2008). Using Student Data for Teacher Reflection. *Canadian Journal for New Scholars in Education*, 1(1), 1-17. <https://journalhosting.ucalgary.ca/index.php/cjnse/article/view/30389>
- McFadden, J., Ellis, J., Anwar, T., & Roehrig, G. (2013). Beginning Science Teachers' Use of a Digital Video Annotation Tool to Promote Reflective. *Journal of Science Education and Technology*, 23(3), 458-470. <https://doi.org/10.1007/s10956-013-9476-2>
- Merino, C., & García, A. (2019). Incorporation of Augmented Reality for the Development of Visualization Capabilities. A Study of High School Students Understanding of the Atomic Model. *Pensamiento Educativo. Revista de Investigación Educativa Latinoamericana*, 56(2), 1-23. <http://www.pensamientoeducativo.uc.cl/index.php/pel/article/view/24445/215>

- Mezirow, J. (1997). Transformative Learning: Theory to Practice. *New directions for Adult and Continuing Education*. 74, 5-12, <https://doi.org/10.1002/ace.7401>
- Michos, K., Hernández-Leo, D., & Albó, L. (2018). Teacher-led inquiry in technology- supported school communities. *British Journal of Educational Technology*. 49(6),1077-1095. <https://doi.org/doi:10.1111/bjet.12696>
- Mitchell, V.A. (2017). Diffracting Reflection: A Move Beyond Reflective Practice. *Education as Change*. 21(2), 165-186. <http://dx.doi.org/10.17159/1947-9417/2017/2023>
- Moseley, M., Maloch, B., & Hoffman, J. V. (2016). Retrospective Video Analysis: A Reflective Tool for Teachers and Teacher Educators. *The Reading Teacher*. 70(5). 533-542. <https://doi.org/10.1002/trtr.1550>
- Mullet, D. (2018). A General Critical Discourse Analysis Framework for Educational Research. *Journal of Advanced Academics*. 29(2), 116-142. <https://doi.org/10.1177/1932202X18758260>
- Nickerson, R.S. (2012). Can Technology Help Teach for Understanding? In Perkins, D.N. Schwartz, J., Maxwell West, M., Stone Wiske, M. *Software Goes to School: Teaching for Understanding with New Technologies*. Oxford Scholarship Online. 8-22. <https://doi.org/10.1093/acprof:oso/9780195115772.001.0001>
- Newhouse, C.P. (2017). STEM the Boredom: Engage Students in the Australian Curriculum Using ICT with Problem-Based Learning and Assessment. *Journal of Science and Education Technology*. 26, 44-57. <https://doi.org/10.1007/s10956-016-9650-4>
- Newton, D. (2012). *Teaching for understanding what it is and how to do it?* Oxon and New York: Springer
- Novoa, A. (2016a). *Attitudes of Chilean private schoolteachers regarding the integration of ICT*. [Unpublished Manuscript], UCL IOE.
- Novoa, A. (2016b). *Survey validity: a pilot study concerning the degrees of digital literacy in secondary teachers of Chilean private education*. [Unpublished Manuscript], UCL IOE.

- Novoa, A. (2017, 13 June). *ICT in teaching: a mixed method approach to explore the uses of digital technologies in secondary education*. [Conference session], UCL IOE Summer Conference, London, United Kingdom.
- Novoa, A. (2018). *Digital literacies, curriculum and pedagogies in the uses of ICT in teaching: two cases at a secondary Chilean private institution*. [Unpublished Manuscript], UCL IOE.
- Novoa-Echaurren, A., & Canales-Tapia, A. (2018). Pedagogical Uses of Digital Technologies by Pre and In-Service Teachers: Literature Review from a Global Perspective to the Chilean Context. *Proceedings of the 2nd Innovative and Creative Education and Teaching International Conference*. 2(21). 1335-1340. <https://doi.org/10.3390/proceedings2211335>
- Novoa, A. (2019). Exploring teachers' reflexive practices associated with their pedagogical uses of ICT: a consideration of the broader ecosystem of teaching. [Unpublished Manuscript], UCL IOE.
- Novoa-Echaurren, A. (2020). Reflexive Practices Associated with Teachers' Pedagogical Use of ICT: a Chilean Case. *Proceedings of the 9th Teaching & Education Virtual Conference*, Vienna, 34-46. <https://doi.org/10.20472/TEC.2020.009.004>
- Nussbaum, M., Alvarez, C., McFarlane, A., Gomez, F., Claro, S., & Radovic, D. (2009). Technology as small group face-to-face Collaborative Scaffolding. *Computers & Education*. 52(1), 147-153. <https://doi.org/10.1016/j.compedu.2008.07.005>
- OECD (2009). *Creating Effective Teaching and Learning Environments. First results from TALIS*. OECD Publishing. <https://doi.org/10.1787/23129638>
- OECD (2015). *Students, Computers and Learning. Making the Connection*. OECD Publishing. <https://doi.org/10.1787/19963777>
- Oliver, M. (2013). Learning technology: Theorising the tools we study. *British Journal of Educational Technology*, 44(1), 31-43. <https://doi.org/10.1111/j.1467-8535.2011.01283.x>

- Ortiz, I. (2013). Gestión curricular en las escuelas con tecnologías de la información y la comunicación. Sistematización de algunas experiencias en Chile. *Perfiles educativos*. 35(141), 152-166. [https://doi.org/10.1016/S0185-2698\(13\)71840-3](https://doi.org/10.1016/S0185-2698(13)71840-3)
- Osterman, K.F., & Kottcamp, R. (1993). *Reflective Practice for Educators Improving Schooling Through Professional Development*. California: Corwin Press, Inc.
- Pachler N., Bachmair B., & Cook J. (2010). User-Generated Content and Contexts: An Educational Perspective. In: Pachler, N., Bachmair, B., & Cook, J. (2010). *Mobile Learning Structures, Agency, Practices*. Boston: Springer. 273-296. https://doi.org/10.1007/978-1-4419-0585-7_11
- Papert, S. (1980). *Mindstorms. Children, Computers and Powerful Ideas*. New York: Basic Books
- Pardo, L., Jovanović, J., Dawson, S., Gašević, D., & Mirriahi, N. (2019). Using learning analytics to scale the provision of personalised feedback. *British Journal of Educational Technology*. 50(1), 128-138. <https://doi.org/10.1111/bjet.12592>
- Parke, H.M., & Coble, C.R. (1997). Teachers Designing Curriculum as Professional Development: A Model for Transformational Science Teaching. *Journal of Research in Science Teaching*. 34(8), 773-789. [https://doi.org/10.1002/\(SICI\)1098-2736\(199710\)34:8%3C773::AID-TEA2%3E3.0.CO;2-S](https://doi.org/10.1002/(SICI)1098-2736(199710)34:8%3C773::AID-TEA2%3E3.0.CO;2-S)
- Pearson, M., & Naylor, S. (2006). Changing contexts: Teacher professional development and ICT pedagogy. *Education and Information Technology*. 11, 283-291 <https://doi.org/10.1007/s10639-006-9013-5>
- Peng, J., Wang, M., Sampson, D., & van Merriënboer, J. J. G. (2019). Using a visualisation-based and progressive learning environment as a cognitive tool for learning computer programming. *Australasian Journal of Educational Technology*. 35(2), 52-68. <https://doi.org/10.14742/ajet.4676>

- Perkins, D.N., & Blythe, T. (1998). *The Teaching for Understanding Guide*. New York: John Wiley & Sons.
- Perkins, D.N. (1993). Teaching for Understanding. *The Professional Journal of the American Federation of Teachers*. 17(3), 28-35.
- Perryman, J. (2011). The return of the native: the blurred boundaries of insider/outsider research in an English secondary school. *International Journal of Qualitative Studies in Education*. 24(7), 857-874. <https://doi.org/10.1080/09518398.2010.529842>
- Philipsen, B., Tondeur, J., Pynoo, B., Vanslambrouck, S., & Zhu, C. (2019). Examining lived experiences in a professional development program for online teaching: A hermeneutic phenomenological approach. *Australasian Journal of Educational Technology*. 35(5), 96-107. <https://doi.org/10.14742/ajet.4469>
- Player-Koro, C., Bergviken Rensfeldt, A., & Selwyn, N. (2018). Selling tech to teachers: education trade shows as policy events. *Journal of Education Policy* 33 (5). 682-703. <https://doi.org/10.1080/02680939.2017.1380232>
- Porayska-Pomsta, K., Preston, C., Lørke Weitze, C., & Younie, S. (2018). Technology to provide educational practitioners with the expertise they need. In: Luckin, R (ed.). *Enhancing Learning and Teaching with Technology. What the Research Says*. London: UCL Institute of Education Press, 286-314
- Puenteadura, R. (2015). *Learning, Technology, and the SAMR Model: Goals, Processes, and Practice*. <http://www.hippasus.com/rrpweblog/archives/2014/06/29/LearningTechnologySAMRModel.pdf>
- Pynoo, B., Devolder, P., Tondeur, J., & van Braak, J. (2011). Predicting secondary school teachers' acceptance and use of a digital learning environment: A cross-sectional study. *Computers in Human Behavior*. 27. 568-565. <https://doi.org/10.1016/j.chb.2010.10.005>

- Redondo, A. (2014). Fostering an international dimension and global citizenship in secondary education with digital technologies. In: Leask, M., & Pachler, N. *Learning to teach with ICT in the secondary school. A companion to School Experience*. Oxon: Routledge, 174-184
- Reinhold, P. (1999). Case studies of teachers' reflective practice within the developmental research project PING. *Journal of Curriculum Studies*. 31(5) 545-570, <https://doi.org/10.1080/002202799183007>
- Remijan, K.W. (2016). Project-Based Learning and Designed-Focused Projects to Motivate Secondary Mathematic Students. *The Interdisciplinary Journal of Problem-Based Learning*. 11(1). <http://dx.doi.org/10.7771/1541-5015.1520>
- Ricoy, M.C., & Sánchez-Martínez, C. (2019). Tablet use in primary education. *Technology, Pedagogy and Education*. 28(3), 301-316. <https://doi.org/10.1080/1475939X.2019.1608291>
- Rodríguez, P., Nussbaum, M., López, X., & Sepúlveda, M. (2010). A Monitoring and Evaluation Scheme for an ICT-Supported Education Program in Schools. *Educational Technology & Society*. 13 (2), 166–179. <https://www.jstor.org/stable/jeductechsoci.13.2.166>
- Rodríguez, P., Nussbaum, M. & Dombrowskaia, L. (2012). ICT for education: a conceptual framework for the sustainable adoption of technology-enhanced learning environments in schools. *Technology, Pedagogy and Education*. 21(3), 291-315, <https://doi.org/10.1080/1475939X.2012.720415>
- Rodríguez-Valls, F. (2014) Reflective teaching: theory within classroom practices. *Teaching Education*. 25(3), 294-308. <https://doi.org/10.1080/10476210.2014.889669>
- Salinas, A., & Sánchez, J. (2009). Digital inclusion in Chile: Internet in rural schools. *International Journal of Educational Development*, 29, 573-582. <https://doi.org/10.1016/j.ijedudev.2009.04.003>

- Salinas, A., Nussbaum, M., Herrera, O. & Solarte, M. (2016). Factors affecting the adoption of information and communication technologies in teaching. *Education and Information Technologies*. 22(5), 2175-2196. <https://doi.org/10.1007/s10639-016-9540-7>
- Salomon, G., Perkins, D.N., & Globerson, T. (1991). Partners in cognition: extending human intelligence with intelligent technologies. *Educational Researcher*. 20(3), 2-9. <https://doi.org/10.3102/0013189X020003002>
- Samaras, A.P., & Fox, R. K. (2013). Capturing the process of critical reflective teaching practices through e-portfolios. *Professional Development in Education*. 39(1), 23-41, <https://doi.org/10.1080/19415257.2012.682318>
- Sánchez, J., & Salinas, A. (2008). ICT & learning in Chilean schools: Lessons learned. *Computers & Education*. 51, 1621-1623. <https://doi.org/10.1016/j.compedu.2008.04.001>
- Sánchez, J., Salinas, A., & Harris, J. (2011). Education with ICT in South Korea and Chile. *International Journal of Educational Development*. 31, 126-148. <https://doi.org/10.1016/j.ijedudev.2010.03.003>
- Schildkamp, K., Wopereis, I., De-Jong, K., Peet, A., & Ijsbrandt H. (2020). Building blocks of instructor professional development for innovative ICT use during a pandemic. *Journal of Professional Capital and Community*. 5(2), <https://doi.org/10.1108/JPCC-06-2020-0034>
- Scherer, R., Siddiq, F., & Tondeur, J. (2020). All the same or different? Revisiting measures of teachers' technology acceptance. *Computers & Education*. 143. 1-17. <https://doi.org/10.1016/j.compedu.2019.103656>
- Schön, D. A. (1983). *The Reflective Practitioner: How professionals think in action*. New York: Basic Books, Inc.
- Scrimshaw, P. (2004). *Enabling teachers to make successful use of ICT*. London: BECTA. <http://www.becta.org.uk>
- Seipold, J., & Pachler, N. (2011). Evaluating Mobile Learning Practice. Towards a framework for analysis of user-generated contexts with reference to the

- socio-cultural ecology of mobile learning. *MedienPädagogik*. 19. 1-13.
<https://doi.org/10.21240/mpaed/19/2011.04.21.X>
- Seipold, J., Pachler, N., Bachmair, B., & Honneger, B.D. (2014). Mobile learning: Strategies for Planning with Mobile Devices in Secondary School Contexts. *Learning to teach using ICT in the Secondary School. A Companion to School Experience*. Oxon: Routledge.185-204.
- Sellars, M. (2012). Teachers and change: The role of reflective practice. *Procedia - Social and Behavioral Sciences*. 55, 461-469.
<https://doi.org/10.1016/j.sbspro.2012.09.525>
- Selwyn, N. (2011). *Education and Technology: Key Issues and Debates*. London: Bloomsbury Publishing.
- Selwyn, N., Hillman, T., Eynon, R., Ferreira, G, Knox, J., Macgilchrist, F., & Sancho-Gil, J.M. (2020). What's next for Ed-Tech? Critical hopes and concerns for the 2020s. *Learning, Media and Technology*. 45(1), 1-6.
<https://doi.org/10.1080/17439884.2020.1694945>
- Shor, I., & Freire, P. (1987). *A Pedagogy for Liberation. Dialogues on Transforming Education*. Connecticut & London: Bergin & Garvey
- Silcock, P. (1994). The Process of Reflective Teaching. *British Journal of Educational Studies*. 42(3), 273-285. <https://doi.org/10.2307/3121886>
- Smyth, J. (1992). Teachers' Work and the Politics of Reflection. *American Educational Research Journal*. 29(2), 267-300.
<https://doi.org/10.3102/00028312029002268>
- Sparks-Langer, G.M., & Berstein Colton, A. (1991). Synthesis of Research on Teachers' Reflective Thinking. *Educational Leadership*. 41(6), 37-44.
- Stockless, A. (2018). Acceptance of learning management system: The case of secondary school teachers. *Education and Information Technologies*. 23, 1101-1121. <https://doi.org/10.1007/s10639-017-9654-6>
- Stone Wiske, M., Rennebohm, F., & Breit, L. (2013). *Teaching for understanding with technology*. San Francisco: John Wiley & Sons.

- Svihla, V., Reeve, R., Sagy, O., & Kali., Y. (2015). A fingerprint pattern of supports for teachers' designing of technology-enhanced learning. *Instructional Science*. 43, 283-307. <https://doi.org/10.1007/s11251-014-9342-5>
- Svihla, V. (2016). Facilitating Problem Framing in Project-Based Learning. *The Interdisciplinary Journal of Problem-Based Learning*. 10(2). <http://dx.doi.org/10.7771/1541-5015.1603>
- Tallvid, M. (2016). Understanding teachers' reluctance to the pedagogical use of ICT in the 1:1 classroom. *Education and Information Technology*. 21. 503-519. <https://doi.org/10.1007/s10639-014-9335-7>
- Taylor, S., Bodman, S., & Morris, H. (2015). Politics, policy and teacher agency. In: Wyse, D. Davis, R. Jones, P., & Rogers, S. (eds.). *Exploring education and childhood*. Oxon: Taylor & Francis/Routledge.
- Tight, M. (2017). *Understanding Case Study Research. Small-scale Research with Meaning*. London: Sage.
- Tondeur, J., van Keer, H., van Braak, K., & Valke, M. (2007). ICT integration in the classroom: Challenging the potential of a school policy. *Computers & Education*. 51, 212-223. <https://doi.org/10.1016/j.compedu.2007.05.003>
- Tondeur, J., Kershaw, L., Vanderlinde, R., & van Braaak, J. (2013). Getting inside the black box of technology integration in education: Teachers' stimulated recall of classroom observations. *Australasian Journal of Educational Technology*. 29(3), 434-449. <https://doi.org/10.14742/ajet.16>
- Tondeur, J., Forkosh-Baruch, A., Prestridge, S., Albion, P., & Edirisinghe, S. (2016). Responding to Challenges in Teacher Professional Development for ICT Integration in Education. *Educational Technology & Society*. 19(3), 110-120. <https://www.jstor.org/stable/jeductechsoci.19.3.110>
- Tondeur, J., van Braak, J., Ertmer, P., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: a systematic review of qualitative evidence.

- Educational Technology Research and Development*. 65(3), 555-575.
<http://dx.doi.org/10.1007/s11423-016-9492-z>
- Tondeur, J., Petko, D., Christensen, R., Drossel, K., Starkey, L., Knezek, G., & Schmidt-Crawford, D.A. (2021). Quality criteria for conceptual technology integration models in education: bridging research and practice. *Educational Technology Research and Development*. 1-22.
<https://doi.org/10.1007/s11423-020-09911-0>
- Tse, S. W., Choi, L.Y. A., & Tang, W.S. (2019). Effects of video-based flipped class instruction on subject reading motivation. *British Journal of Educational Technology*. 50(1), 385-398.
<https://doi.org/10.1111/bjet.12569>
- Turvey, K., & Pachler, N. (2018). Tablet Devices in Education: Beyond Face-Value. In: Luckin, R. (ed). *Enhancing learning and teaching with technology. What the research says*. London: UCL Institute of Education Press, 154-164.
- Vanderblinde, R., van Braak, J., & Dexter, S. (2012). ICT policy planning in a context of curriculum reform: Disentanglement of ICT policy domains and artifacts. *Computers & Education*. 58, 1339-1350.
<https://doi.org/10.1016/j.compedu.2011.12.007>
- Van Manen, M. (1995). On the Epistemology of Reflective Practice. *Teachers and Teaching: theory and practice*, 1(1), 33-50.
<https://doi.org/10.1080/1354060950010104>
- Vásquez, A., Nussbaum, M., Sciarriesi, E., Martínez, T., Barahona, C., & Strasser, K. (2017) The Impact of the Technology Used in Formative Assessment: The Case of Spelling. *Journal of Educational Computing Research*, 54(8) 1142–1167. <https://doi.org/10.1177/0735633116650971>
- Vygotsky, L.S. (1978). *Mind in Society. The Development of Higher Psychological Processes*. Cambridge, MA: Cambridge University Press.
- Vygotsky, L. (1986). *Thought and Language*. Cambridge, Massachusetts and London: MIT Press.

- Warwick, P., Cook., V., Vrikki, M., Major, L., & Rasmussen, I. (2020). Realising 'dialogic intentions' when working with a microblogging tool in secondary school classrooms. *Learning, Culture and Social Interaction*. 24, 1-19. <https://doi.org/10.1016/j.lcsi.2019.100376>
- Webb, M. (2014). Pedagogy and ICT. In: Leask, M., & Pachler, N. *Learning to teach with ICT in the secondary school. A companion to School Experience*. Oxon: Routledge, 67-83.
- Whitehead, B., Jensen, F.N., & Boschee, F. (2013). *Planning for technology. A guide for school administrators, technology coordinators and curriculum leaders*. Thousand Oaks: Corwin Sage Publications.
- Whittle, C., Tiwari, S., Yan, S., & Williams, J. (2020). Emergency remote teaching environment: a conceptual framework for responsive online teaching in crises. *Information and Learning Science*. 121(5/6). 311-319. <http://dx.doi.org/10.1108/ILS-04-2020-0099>
- Whitty, G. (2008). Changing modes of teacher professionalism: traditional, managerial, collaborative and democratic. In: Cunningham, B. (ed). *Exploring professionalism*. London: IOE Press. 28-49.
- Williams, L., Mead, L., Mead, L., & Leask, M. (2014). Whole-school approaches: integrating ICT across the curriculum. In: Leask, M. & Pachler, N. *Learning to teach with ICT in the secondary school. A companion to School Experience*. Oxon: Routledge, 205-220.
- Williamson, B., Eynon, R., & Potter, J. (2020) Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency. *Learning, Media and Technology*. 45(2), 107-114. <https://doi.org/10.1080/17439884.2020.1761641>
- Xing, W., & Du, D. (2019). Dropout Prediction in MOOCs: Using Deep Learning for Personalized Intervention. *Journal of Educational Computing Research*. 57(3), 547-570. <http://dx.doi.org/10.1177/0735633118757015>
- Yin, R.K. (2018). *Case Study Research and Applications: Design and Methods*. London: Sage.

- Zawacki-Richter, O., Marín, V.I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal in Higher Education*. 16(39), 2-27. <https://doi.org/10.1186/s41239-019-0171-0>
- Zhai, X., Zhang, M., Li, M., & Zhang, X. (2019). Understanding the relationship between levels of mobile technology use in high school physics classrooms and the learning outcome. *British Journal of Educational Technology*. 50(2). 750-766. <https://doi.org/10.1111/bjet.12700>

Appendix 1. Figure 1 – References

- (1) Claro et al., 2013; Charbonneau-Gowdy, 2015; Hinostroza et al., 2002; Hinostroza et al., 2011; Hinostroza et al., 2016; Ibieta et al., 2017; Jara et al., 2015; Nussbaum et al., 2009; Ortiz, 2013; Rodríguez, et al. 2012; Salinas & Sánchez, 2009; Vásquez et al., 2017;
- (2) Claro et al., 2018; Jaramillo & Chávez, 2015; Rodríguez, et al., 2012; Salinas et al., 2016;
- (3) Cordero et al., 2015; Claro, 2010; Claro et al., 2013; Fariña et al., 2015; Hinostroza et al., 2016;
- (4) Claro & Jara, 2020; Hinostroza et al., 2011; Rodríguez et al., 2010; Rodríguez, et al., 2012; Sánchez & Salinas, 2008; Salinas & Sánchez, 2009.

Appendix 2. Figure 2 – References

- (1) Bond et al., 2019; John & Sutherland, 2006; Joo-Nogata et al., 2017; Jouneau-Sion & Sánchez, 2013; Kemp et al., 2019; Kizilcec, et al., 2017; Klašnja-Milićević & Ivanović, 2018; Laurillard, 2007; Llorens et al., 2017; Lørke Weitze, 2018; Luckin, & Weatherby, 2018; Merino & García, 2019; Newhouse, 2017; Oliver, 2013; Pachler, et al., 2010; Zawacki-Richter et al., 2019.

- (2) Aguayo et al., 2019; Berland et al., 2015; Bond, 2020; Bond et al., 2019; Broadbendt, 2017; Bano et al., 2018; Claro, 2010; Claro et al., 2013; Cox, 2014; Dinsmore, 2019; Ertmer & Ottenbreit-Lefwich, 2010; Greenhow & Askari, 2015; Hernández-Sellés et al., 2019; Hinostroza, et al., 2016; Ibieta et al., 2017; OECD, 2015; Tondeur et al., 2017; Tse et al., 2019; Turvey & Pachler, 2018; Warwick et al., 2020; Williamson et al., 2020; Xing & Du, 2019.
- (3) Albion & Tondeur, 2018; Ertmer & Ottenbreit-Leftwich, 2012; Hinostroza et al., 2016; Ibieta et al., 2017; Tallvid, 2016.
- (4) Albion & Tondeur, 2018; Bleakly, 1999; Briscoe, 2018, Copeland et al., 1993; Craig, 2010; Day, 1999; Dewey, 1910; Dewey, 1922; Freire, 2011; Freire, 2014; Glenn, 2011; Lim et al., 2013; Loughran, 2002; McFadden et al., 2013; Michos et al., 2018; Mitchell, 2017; Osterman & Kottcamp, 1993; Parke & Coble, 1997; Philipsen et al., 2019; Pynoo et al., 2011; Rodríguez-Valls, 2014; Scherer, et al., 2020; Schildkamp et al., 2020; Sellars, 2012; Stockless, 2018; Tallvid, 2016; Taylor, et al., 2015.
- (5) Albion & Tondeur, 2018; Claro & Jara, 2020; Crook, 2008; Crook, 2015; Lowyck, 2013; OECD, 2009; Vanderblinde et al., 2012.

Appendix 3. Figure 3 - References

- (1) Cox, 2014; Fisher, et al., 2006; Pearson & Naylor, 2006; Porayska-Pomsta et al., 2018; Whitehead et al., 2010
- (2) Whitehead et al., 2010
- (3) Pearson & Naylor, 2006
- (4) Fisher et al., 2006; Porayska-Pomsta et al., 2018
- (5) Fisher et al., 2006
- (6) Fisher et al., 2006
- (7) Whitehead, et al., 2010
- (8) Whitehead et al., 2010
- (9) Cox, 2014; Whitehead et al., 2010
- (10) Cox, 2014; Whitehead et al., 2010

- (11) Cox, 2014
- (12) Davis, 1997; Webb, 2014
- (13) Webb, 2014
- (14) Scrimshaw, 2004; Webb, 2014
- (15) Webb, 2014
- (16) Scrimshaw, 2004
- (17) Davis, 1997; Hennessy, 2012; Redondo, 2014; Scrimshaw, 2004; Webb, 2014; Williams, et al., 2014
- (18) Crowe & Flynn, 2014
- (19) Davis, 1997; Scrimshaw, 2004

Appendix 4. Figure 4 – References

- (1) Papert, 1980
- (2) Laurillard, 2012
- (5) Vygotsky, 1978
- (5) Biggs, 2005; Biggs & Tang, 2011
- (8) Stone Wiske et al., 2013
- (6) Koehler & Mishra, 2009; Koehler et al., 2013
- (8) Geer et al., 2017; Puentedura, 2015; Zhai et al., 2019
- (9) Barthes, 1977; Fairclough, 1989; Foucault, 1982
- (10) Bachmair & Pachler, 2014; Bezemer & Kress, 2008; Bezemer & Kress, 2016; Kress, 2010; Kress & Selander, 2012; Pachler et al., 2010

Appendix 5. Figure 5 - References

- (1) Dewey, 2001, 2010 & 2012; Freire & Shor, 2014; Freire & Nogueira, 1989
- (2) Dewey, 1914; Freire, 2014; Freire & Nogueira, 1989
- (3) Dewey, 1910 & 1914; Freire, 2011
- (4) Dewey, 1910; Freire, 2011
- (5) Dewey, 1910; Freire, 2011; Freire, 2014

- (6) Dewey, 1910 & 2012; Freire & Shor, 2014
- (7) Dewey, 1922 & 2012; Freire, 2005
- (8) Freire & Shor, 2014
- (9) Freire, 2011; Freire & Shor, 2014
- (10) Dewey, 1922
- (11) Dewey, 1922
- (12) Dewey, 1914
- (13) Freire, 2011

Appendix 6. Figure 7 – References

- (1) Brookfield, 1998; Cole & Knowles, 1998; Day, 1999; Jay, 1999; Markham, 1999; Osterman & Kottcamp, 1993; Silcock, 1994; Van Manen, 1995
- (2) Bleakley, 1999; Cole & Knowles, 1998; Gore & Zeichner, 1991; Liston & Zeichner, 1990; Markham, 1999; Sellars, 2012; Van Manen, 1995
- (3) Mathew et al., 2012; Osterman & Kottcamp, 1993; Sellars, 2012; Silcock, 1994; Van Manen, 1995
- (4) Cole & Knowles, 1998; Copeland, et al., 1993; Jay, 1999; Loughran, 2002
- (5) Brookfield, 1998; Gore & Zeichner, 1991; Loughran, 2002; Mezirow, 1997, Smyth, 1992; Sparks-Langer & Berstein Colton, 1991; Van Manen, 1995
- (6) Benade, 2015; Mezirow, 1997; Markham, 1999; Smyth, 1992; Taylor et al., 2015; Van Manen, 1995
- (7) Loughran, 2002
- (8) Biggs & Tang, 2011; Mezirow, 1997; Silcock, 1994; Smyth 1992
- (9) Mezirow, 1997
- (10) Loughran, 2002; Mezirow, 1997; Silcock, 1994
- (11) Gore & Zeichner, 1991

Appendix 7. Ethics

Appendix 7. 1. Information Letter. Teachers.

Institute of Education



Reflexive practices associated with the pedagogical uses of ICT

August 2019-December 2021

Information letter

My name is Angela Novoa. I'm inviting you to participate in my thesis that explores the reflexive practices of teachers associated with the pedagogical uses of ICT. Throughout the last decade, I've been involved in the field of educational technology, by preparing and supporting teachers in professional development opportunities. Considering my professional background, I decided to continue my academic development at UCL Institute of Education. UCL is one of the most prestigious universities in UK and the world. IOE has gained a respected position in terms of education and Social Sciences research.

This study aims to examine the reflexive practices of teachers dealing with their uses of ICT as well as the patterns and differences across teaching contexts and subject domains. I very much hope that you desire to participate in this project. This information letter will try to answer any query that you may have about the study. If you have any additional query, please do not hesitate to contact me (██████████).

Why this thesis is being conducted?

This research will explore the reflexive processes undertaken inside your school regarding the ICT teaching practices of the participants, in order to keep refining them over time. This area has become a key issue to consider in a context where ICT have become relevant to policy, academy and the teaching profession.

Why am I invited to take part?

I have invited you to participate because your school has become a unique institution concerning the encouragement of reflexive practices and pedagogical uses of ICT. In addition, you have used ICT in your teaching practice, which is key for the exploration of the phenomenon.

What will happen if I decide to take part?

I will ask you to authorize me to observe 1 class in which you use any kind of ICT (in any way) and 1 reflexive practice meeting associated to that particular class. These instances will be supported with videos and/or audios, if you authorize me to do so. These resources will be used exclusively for the purposes of this research and will not be publicly disclosed. Finally, I will request access to documents associated with the class observed, such as lesson plans. Sharing these documents with me will also be voluntary.

Will someone know that I will participate in the thesis?

I will know about your participation; your students will be aware of your involvement and some colleagues and school authorities will also acknowledge your contribution to the thesis. The name of your institution and your name will not be disclosed with anyone.

Appendix 7. 2. Information Letter. Heads of Department.

Institute of Education



Reflexive practices associated with the pedagogical uses of ICT
August 2019-December 2021

Information letter

My name is Angela Novoa. I'm inviting you to participate in my thesis that explores the reflexive practices of teachers associated with the pedagogical uses of ICT. Throughout the last decade, I've been involved in the field of educational technology, by preparing and supporting teachers in professional development opportunities. Considering my professional background, I decided to continue my academic development at UCL Institute of Education. UCL is one of the most prestigious universities in UK and the world. IOE has gained a respected position in terms of education and Social Sciences research.

This study aims to examine the reflexive practices of teachers dealing with their uses of ICT as well as the patterns and differences across teaching contexts and subject domains. I very much hope that you desire to participate in this project. This information letter will try to answer any query that you may have about the study. If you have any additional query, please do not hesitate to contact me ([REDACTED]).

Why this thesis is being conducted?

This research will explore the reflexive processes undertaken inside your school regarding the ICT teaching practices of the participants, in order to keep refining them over time. This area has become a key issue to consider in a context where ICT have become relevant to policy, academy and the teaching profession.

Why am I invited to take part?

I have invited you to participate because your school has become a unique institution concerning the encouragement of reflexive practices and pedagogical uses of ICT. In addition, you have used ICT in your teaching practice, which is key for the exploration of the phenomenon.

What will happen if I decide to take part?

I will ask your authorization to observe one reflexive practice meeting and participate in one-hour interview associated with the observation. These instances will be supported with videos and/or audios recordings, if you authorize me to do so. These resources will be used exclusively for the purposes of this research and will not be publicly disclosed. Finally, I will request access to documents associated with the observations, such as lesson plans. Sharing these documents will also be voluntary.

Will someone know that I will participate in the thesis?

I will know about your participation; your students will be aware of your involvement and some colleagues and school authorities will also acknowledge your contribution to the thesis. The name of your institution and your name will not be disclosed with anyone.

**Can there be problems if I decide to participate?**

It is difficult to anticipate any problem derived from your participation in the thesis. However, if you feel uncomfortable at any time, you are free to withdraw from the project and ask the removal of your data.

What will happen with the results of the thesis?

Anonymised findings will be disclosed to UCL IOE examiners and my supervisors. In addition, these **anonymised results** can be sent for publication to academic journals, conferences and professional development activities. As mentioned before, your name or the name of your institution will not be disclosed.

Am I obliged to participate?


No. Your participation is entirely voluntary. I hope that, if you decide to do so, you consider it a valuable experience.

Thank you for reading this information letter. If you decide to participate, please, fill the consent letter that I will deliver and return it to me. If you have any additional query you can contact me at

This project was reviewed and approved by UCL IOE Ethics: [REDACTED]

Appendix 7. 3. Example of signed consent form

Institute of Education



Explorando las prácticas reflexivas asociadas a los usos pedagógicos de las TIC
Agosto 2019-Diciembre 2021

Si tienes cualquier pregunta sobre tu participación, por favor siente la libertad de contactarme durante la investigación o después a [REDACTED]

Si decides participar en este estudio, por favor completa esta carta de consentimiento y devuélvela a [REDACTED]

	Si	No
He leído y comprendo el contenido de la carta informativa sobre esta investigación	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Acepto participar en esta tesis de la manera que se ha explicado en la carta informativa	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Entiendo que cualquiera de mis palabras o acciones usadas en informes o presentaciones no serán atribuidas directamente a mí o a mi colegio	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Entiendo que puedo retirarme del proyecto en cualquier momento de la investigación y que, si decido hacerlo, cualquier dato que he aportado no será usado	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Acepto ser grabado/a con un dispositivo de video y entiendo que mi grabación será utilizada de manera anónima	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Entiendo que puedo contactar a [REDACTED] en cualquier momento	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Entiendo que los resultados serán anónimos, pero serán compartidos con los examinadores de [REDACTED] en UCL IOE y que pueden ser enviados a publicación a revistas académicas, conferencias y actividades de desarrollo profesional docente	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Nombre [REDACTED]

Firma [REDACTED] Fecha 08/08/2019

Nombre de l investigador: [REDACTED] Firma [REDACTED]

Este proyecto ha sido revisado y aprobado por el Comité de Ética Investigativa de UCL IOE:
[REDACTED]

UCL Institute of Education

Appendix 8. Literature review codebooks

I developed a theory-driven data analysis. Therefore, I examined the seminal literature associated with 'reflexive practice', 'ICT' and 'CPD' thematically. According to the results, these codes were compared against the data, maintained, refined, replaced, or removed.

	Name	Idea/claim I found in the literature	Document	References
1	Active pedagogies	Articles that link ICT practices with promoting active student participation, mainly through socio-constructivist and constructionist pedagogies.	22	30
2	Authentic learning	Articles that helped me build a definition of authentic learning.	4	4
3	Characterisation - ICT uses	Articles that describe different ICT teaching practices.	49	49
4	Consciousness	Reflexion consists of being aware of the present, the past, the self, everything related to the teachers' work.	6	7
5	Context-specific ICT practice	ICT uses need to account for the specifics of the teaching context.	56	58
6	Covid-19	How Covid 19 outbreak deepens the need to increase reflexion and CPD focused on ICT teaching practices.	4	4
7	CPD about ICT	CPD programmes about ICT use.	11	16
8	CPD Provision	Need to increase CPD provision to foster teachers' ICT reflexive practices.	33	55
9	CPD Research	Researchers should examine CPD, reflexion and ICT practices.	8	8
10	Curriculum & ICT	Teachers should integrate ICT into the curriculum.	11	13
11	Dialectic reflexion	Reflexive practice is a dialectic process between thinking and acting (text and context), theory and practice.	3	3

	Name	Idea/claim I found in the literature	Document	References
12	Dialogue	Reflexive practice is a dialogic activity.	4	6
13	Ecosystemic ICT use	ICT usages are practices embedded into the school ecosystem.	20	31
14	Ecosystemic reflexion	Different layers of the school ecosystem interrelate (e.g., the teacher's own thinking, the collaborative thinking with colleagues, the consideration of the institutional policymakers, among other layers).	25	37
15	Ethics	Reflexion is an ethical practice that always should aim at increasing students' learning.	13	14
16	Factors - ICT uses	Factors that influence how to use ICT in teaching.	2	3
17	ICT as TPD	Use of ICT as TPD to think about the teaching practice.	4	4
18	ICT neutrality	Some teachers and researchers assume that ICT is neutral and inherently offers learning gains.	6	6
19	ICT- teaching design	The teacher needs to generate sensible designs suitable for the specificities of the teaching contexts.	12	25
20	Implicit-explicit	Reflexive practice is a way of making implicit ideas explicit.	2	2
21	Iteration	Reflexion is an iterative process in which the professional foresees, implements, assesses, feedforwards, and so forth. Reflexion moves back and forth permanently.	13	16
22	Narrowed reflexion	Reflective practice: the fixed view that reflection implies thinking about past experiences without considering the socio-cultural context in which the practice is embedded.	11	25

	Name	Idea/claim I found in the literature	Document	References
23	Pedagogy before technology	Pedagogy should prevail over the technical aspect referred to the ICT use.	18	27
24	Policy & Practice Gap	Policymakers and teachers have divergent views regarding teaching with ICT (i.e., policymakers' thinking about how ICT should be used with students and what teachers can do).	24	39
25	Reflexion & democracy	Reflexion is a way of democratic teaching. This idea is associated with teacher agency about making autonomous decisions and choices responsibly.	3	6
26	Reflexion & Higher-order skills	Reflexion develops creativity, collaborative problem-solving, critical thinking, metacognition through reflexive practice, among other skills.	20	32
27	Reflexion - making sense	Reflexion to make sense of the practice.	10	13
28	Reflexion for refinement	Reflexion to improve ICT practices over time.	6	8
29	Reflexion for transformation	Reflexion to change existing socio-cultural/socio-political practices.	8	12
30	Research and practice	There is a need to bridge the gap between educational research and professional practice.	1	2
31	Socio-cultural	ICT teaching is a socio-cultural practice.	16	22
32	Space	Teachers consider this feature when deciding how to use ICT in teaching. It refers to the organisation of the place in which the practice is situated.	4	5
33	Subject domain	There is a need to master the subject-domain specificities while thinking about ICT teaching practices.	10	17

	Name	Idea/claim I found in the literature	Document	References
34	Teacher agency	Teacher agency fosters enhanced ICT practices.	33	73
35	Collaborative decision-making	Agency is a collaborative process and activity. Teachers make choices with other members of the school ecosystem.	13	24
36	Teachers as learners	Reflexive practice is a way of learning about how teachers work. Therefore, if we assume that teachers are also learners, we understand the feed for CPD regarding ICT practices in the current digital society.	8	11
37	Theory & Practice	Teachers need to link theory and practice, including the pedagogies underlying ICT usages.	29	41
38	Time	Teachers need to learn how to manage and be provided with sufficient time to use ICT teaching.	7	9
39	Traditional ICT uses	ICT uses are based on transmissive teacher-centred pedagogies.	12	17
40	Varied ICT uses	ICT uses in teaching are varied; therefore, determining the best ICT practices is problematic.	43	44

Appendix 9. Data codebooks

After comparing the codes mentioned above with the data, kept, redefined, removed and created new codes. In this way, the theory illuminated the data, and the data allowed to increase the conceptual development of RP in reference to ICT uses in teaching.

	Name	Description	Clarification on when to use	Documents	References	Example
1	Active pedagogies	The ICT practices and the promotion of active student participation are interrelated.	Teachers manifestly encouraged greater participation and commitment of students to their learning while using ICT.	7	25	"The teacher let the students work independently [<i>in pairs</i>] to achieve the second challenge (C2 class observation).
2	Pedagogy before technology	The argument is that how using ICT should prevail over the technical aspect.	Teachers or HoDs explicitly prioritised pedagogical principles over technology in their actions or reflexions.	9	29	"Do we want to show them all the videos? Or do we want the students to leave the school with a full learning experience? You know?" (C3, C4, & C5 HOD's interview).

	Name	Description	Clarification on when to use	Documents	References	Example
3	PBL	The ICT use is integrated with the PBL principles.	Only in C2 & C6 because they integrated PBL principles in their ICT practice.	3	11	"Although PBL suggests that students can pick whatever they want, I fear that they prefer things that would be quite advanced for her current knowledge about programming" (C2 RPM observation).
4	TfU	The ICT use is integrated with the TfU principles.	Reflexions or actions of teachers or HoDs were referred directly to the framework.	6	15	"I think that the aims were accomplished. All the elements of the TfU framework were present and the resource was well used" (C3, C4 & C5 RPM observation).
5	Ecosystemic ICT use	Teachers and HoDs embed their ICT usages into the school ecosystem.	Teachers manifestly considered more than one layer of the school ecosystem while using ICT.	3	8	"He linked this explanation with contents that students were studying in the Physics subject" (C2 class observation).

	Name	Description	Clarification on when to use	Documents	References	Example
6	Ecosystemic reflexion	Teachers and HoDs embed their reflexive practices into the school ecosystem. Such practices are interrelated (i.e., teacher's personal, departmental, and institutional reflexion).	Teachers developed reflexive practices within other layers of the institution (e.g., colleagues of the same department or other departments).	4	18	"Yes, yes. A lot. We dialogue quite a lot with sciences (...) But we've been working with Arts, with Spanish, with History" (C2 & C6 HoD's interview).
8	Dialogue	Teachers and HoDs use dialogue as a means for reflexion.	Teachers, colleagues, and HoDs talked, disagreed, and agreed respectfully about a given ICT use's positive outcomes and challenges.	3	5	"HoD: It can be confusing for the students if they watch the video and see the river with fish and then we say that the geography is dry. CV: Maybe we could make a drawing such as Northern Zone in general and Altiplano HoD: Yes. And it is very easy to explain because it is high and plane (C3, C4 & C5 RPM observation).

	Name	Description	Clarification on when to use	Documents	References	Example
9	Ethics	Teachers' ICT use reveal ethical issues.	Dilemmas arose regarding potential harm to students while using ICT.	5	7	"I think that we need to pass things through some sort of filter. And I'm not sure if this resource would have passed through my filter. I didn't like that last video. I found it quite violent. And I hadn't seen it before the class" (C3, C4 & C5 HoD's interview).
10	Policy & Practice Gap	Policymakers and teachers visualise and/or deal with the gap between policy & practice.	The role of policymakers was visible.	1	8	"I: That's interesting. Do you feel that you have the backup of the school's Headmaster? HoD: All the time" (C2 & C6 HoD's interview).

	Name	Description	Clarification on when to use	Documents	References	Example
11	Reflexion for refinement	Teachers and/or policymakers develop reflexion to amend or improve ICT practices.	Improvement was mentioned or observed from the actions of the participants.	4	8	“HoD: You know? Its’ about, about, ehm, suggesting amendments of some mistakes that they could make, to further opportunities. For instance, with regards to the ‘Altiplano’, I never imagined, and it wasn’t explained well” (C3, C4 & C5 HoD’s interview).
12	Departmental reflexion	Reflexion happens at the departmental level (i.e., between the teacher, the HoD and colleagues of the same department or, in some cases, subject area).	I used the code when examining the reflexive practice meetings and interviews.	5	9	"Through the RPM the team nurtures from the experiences of their colleagues” (C3, C4 & C5 HoD’s interview).
13	Feedback	The teacher receives feedback about a given ICT use.	The HoD or a colleague provided feedback to the teacher regarding the ICT use.	5	13	“HoD: At this point, you missed a deeper discussion about the New Year’s celebration” (C3, C4 & C5 RPM observation).

	Name	Description	Clarification on when to use	Documents	References	Example
14	Feedforward	The teacher suggests new insights, amendments, or critical ideas regarding the ICT practice.	Teachers made a critical appraisal concerning an aspect of the practice they could refine and/or proposed a way to refine it.	4	17	<p>“C1: A thing that happened is that one student seated in the first row didn’t see the third picture. HoD.: Oh. C1: It was too small. I don’t know if only for her, but she didn’t understand first, but it was because she didn’t saw that arrow. HoD.: Oh. C1: But, that’s the only thing. HoD.: Yes, it is over the area surface. C1: Right. HoD.: Maybe, if there’s time, I will write down here ‘improve image’ or ‘find other pictures’” (C1 RPM observation).</p>
15	Informal reflexion	The teacher and/or HoDs did not consider some practices as reflexion because they were not formally established in the school schedule.	The HoDs mentioned reflexive practices that take place in informal opportunities and/or spaces.	2	6	<p>"...it also happens in the hallway, during the recess or by chat [<i>i.e., via WhatsApp</i>]; we resolve those details because in those two hours we cannot resolve them" (C1 HoD's interview).</p>

	Name	Description	Clarification on when to use	Documents	References	Example
16	Horizontal policy	Policymakers and teachers reveal collaborative decision-making.	Horizontal leadership style was observed or the HoDs mentioned it.	5	9	"I don't assume the role of the chief; I don't know because I try to accompany them throughout their practice" (C3, C4 & C5 HoD's interview).
17	ICT for reflexion	Teachers and/or HoDs use ICT as a means for reflexion.	Online communication technologies were used to increase reflexive opportunities.	2	5	"So, in this Drive document, we share basic things, but they were helpful because they were associated with: 'How do we make this thing work?'" (C2 & C6 HoD's interview).
18	Teacher agency	Teacher agency fosters enhanced ICT practices.	Teachers make autonomous decisions and consider the conditions/needs of the school ecosystem.	8	41	"Then I wrote: she doesn't display the whole video, only the things that she is interested in, which is a good thing because, I mean, we need to use the resource the best we can" (C3, C4 & C5 HoD's interview).

	Name	Description	Clarification on when to use	Documents	References	Example
19	Collaborative decision-making	Agency is a collaborative process and activity. Teachers make choices with other members of the school ecosystem.	Decisions regarding the ICT uses are undertaken as a team.	6	27	“HoD: Look, in general the decisions are adopted by the team, with the schedule at hand” (C2 & C6 HoD’s interview).
20	Teachers as learners	Reflexive practice is a learning process about how educators teach with ICT.	Teachers learn from their reflexive practices and ICT uses.	2	4	“At large, we are building together. We are learning together” (C2 & C6 HoD’s interview).
21	Time	Teachers need to learn how to manage and be provided with sufficient time to use ICT teaching.	Teachers and HoDs manifest that time was not enough or is a barrier for innovative ICT uses.	6	8	“Instead, in my case, I have to devote time at home. Sometimes, I see that when we want to innovate or do something different, teachers resist doing so because: ‘Oh, this is more work, this implies more time, so, when do I work on this?’ Why did I mention this example? Because C1 is not part of those teachers” (C1 HoD’s interview).

	Name	Description	Clarification on when to use	Documents	References	Example
22	Dialogic social configuration	The organisation of the ICT use is based primarily on teacher-students, conversations, or discussions.	Teachers promoted learning through dialogue while using ICT (Laurillard, 2012).	5	32	“C3: Yes, I think it was an excellent strategy to stop the video at some points and discuss with them about the content” (C3, C4 & C5 RPM observation).
23	Collaborative production	The ICT use aims at promoting collaborative learning among teachers and students. This code implies the generation of a product as knowledge construction and representation (Laurillard, 2012).	Teachers encouraged collaborative problem-solving and knowledge construction through the creation of a product while using ICT.	4	20	“He approached to the pair of students who had their hands raised. He saw their screens and said: ‘Let’s see. But I need everything opened: the photo and the written text. Otherwise, I cannot help you’” (C6 class observation).

	Name	Description	Clarification on when to use	Documents	References	Example
24	Distributed spatial configuration	The classroom's space is distributed according to the ICT use's pedagogical purposes. For instance, in the technology classes, the computers and other ICTs were located to suit experimentation and collaborative learning.	The learning experience was distributed across the classroom. Students' and teachers' location was defined by the tasks they achieved and the challenges that remained while using ICT.	2	9	"When each pair completed the programming phase in the online platform, the teacher gave them the robot to test the instructions they had already programmed. For so doing, each pair connected the robot to the computer. Then, they tested the robot's movements on the rug located at the centre of the room" (C2 class observation).

	Name	Description	Clarification on when to use	Documents	References	Example
25	Traditional spatial configuration	The students were seated in rows, facing at the whiteboard. Videos or PowerPoint presentations were projected on the whiteboard. The role of the students was passive, and the teacher had a predominant role in the learning experience.	The teacher maintained the traditional classroom spatial configuration (desks facing the whiteboard; the teacher remained primarily at the front of the room).	4	12	“Students worked in an organised way, you were checking the ‘menu’, and then you asked them to get prepared to watch the video, to store their folders, to move the chairs towards the whiteboard” (C3, C4 & C5 RPM observation).
26	Learner's paced temporal configuration	Time organisation is based on personalised learning. The teacher configured the time available for achieving the learning purpose/s according to the ways in which each student completed the learning tasks when using ICT.	The ICT practice duration depends on each student's or team's progress.	4	22	“Some students achieved the challenge correctly, while others made some mistakes in the instructions provided on the platform. In that case, the teacher asked those students to continue working until they solved the mistake” (C2 class observation).

	Name	Description	Clarification on when to use	Documents	References	Example
27	Linear temporal configuration	The teacher considers a conventional temporal structure to organise the ICT learning and teaching experience (i.e., opening, development and closure). The ICT use relies more on content coverage than personalised learning.	The duration of the ICT practice depends on the formal school schedule (e.g., one class-hour).	4	9	“Three minutes before the bell rang, the teacher made a brief closure, explaining what they will do next week and that they will start watching the fourth video” (C4 class observation).

Appendix 10. Class and reflexive practice meetings observation protocol

I conducted two kinds of observation: classroom and reflexive meetings. I based the observation protocols on Bogdan & Biklen (2006) and Bloome et al. (2008). The research questions and the theoretical framework illuminated data collections. In the research site, I used the templates presented on the following pages. Fuller field notes were also taken after each observation and compared against the templates to gain richer information. Template records and field notes considered different kinds of interactions, such as conversational (e.g. teacher-students, teachers-colleagues, teachers-HoDs), range of multimedia use in the classroom (e.g., type of use, for what pedagogical purposes), visual representations (e.g., room layout, positioning of screens, spatial configuration, temporal configuration), among others (Van Dijk, 2001b).

In my research, the purpose of observations is to capture the range of reflexive practices associated with teachers' pedagogical uses of ICT (Freire, 2014; Freire & Shor, 2014). It is anticipated that such practices were best observed as carried out throughout various school layers/dimensions (Van Dijk 2001b):

- interpersonal interactions (e.g., between the teacher and his or her students mediated by a given ICT use).
- group interactions (i.e., among colleagues, in the formal reflexive practice meetings).
- institutional interactions (i.e., as discussed by the school leaders in the interviews).



Exploring teachers' reflexive practices associated with their pedagogical uses of ICT

August 2019 - July 2021

Teachers' ICT practices - Observation template

Case ID	
Grade & number of students	
Subject	
Date	
Class duration	

I. Practical issues

1. Map of the room (physical layout)

2. ICT available in the room

Hardware	No.	Used?	Software	No.	Used?	Comments
Smart board		<input type="checkbox"/>	PPT		<input type="checkbox"/>	
Computer		<input type="checkbox"/>	Web browser		<input type="checkbox"/>	
Wired Internet		<input type="checkbox"/>	App		<input type="checkbox"/>	
Wireless Internet		<input type="checkbox"/>	Social Network		<input type="checkbox"/>	
Mobile phones		<input type="checkbox"/>	Video Streaming		<input type="checkbox"/>	
Tablet		<input type="checkbox"/>	Audio Streaming		<input type="checkbox"/>	
Speakers		<input type="checkbox"/>	Online presentation		<input type="checkbox"/>	
Headphones		<input type="checkbox"/>	LMS		<input type="checkbox"/>	
Others...		<input type="checkbox"/>	Google Drive		<input type="checkbox"/>	
		<input type="checkbox"/>	Google Site		<input type="checkbox"/>	
		<input type="checkbox"/>	Classroom		<input type="checkbox"/>	
		<input type="checkbox"/>	Others...		<input type="checkbox"/>	
		<input type="checkbox"/>			<input type="checkbox"/>	
		<input type="checkbox"/>			<input type="checkbox"/>	
		<input type="checkbox"/>			<input type="checkbox"/>	

II. Pedagogical issues
1. Purpose of the session
School's curriculum:
National curriculum:

--

2. Structure of the class	Role of ICT/How ICT was used		
A. Opening			
B. Development			
C. Closure			
Alignment with the teaching design	Yes <input type="checkbox"/>	Somehow <input type="checkbox"/>	No <input type="checkbox"/>



Exploring teachers’ reflexive practices associated with their pedagogical uses of ICT

August 2019 - July 2021

Reflexive meeting observation template

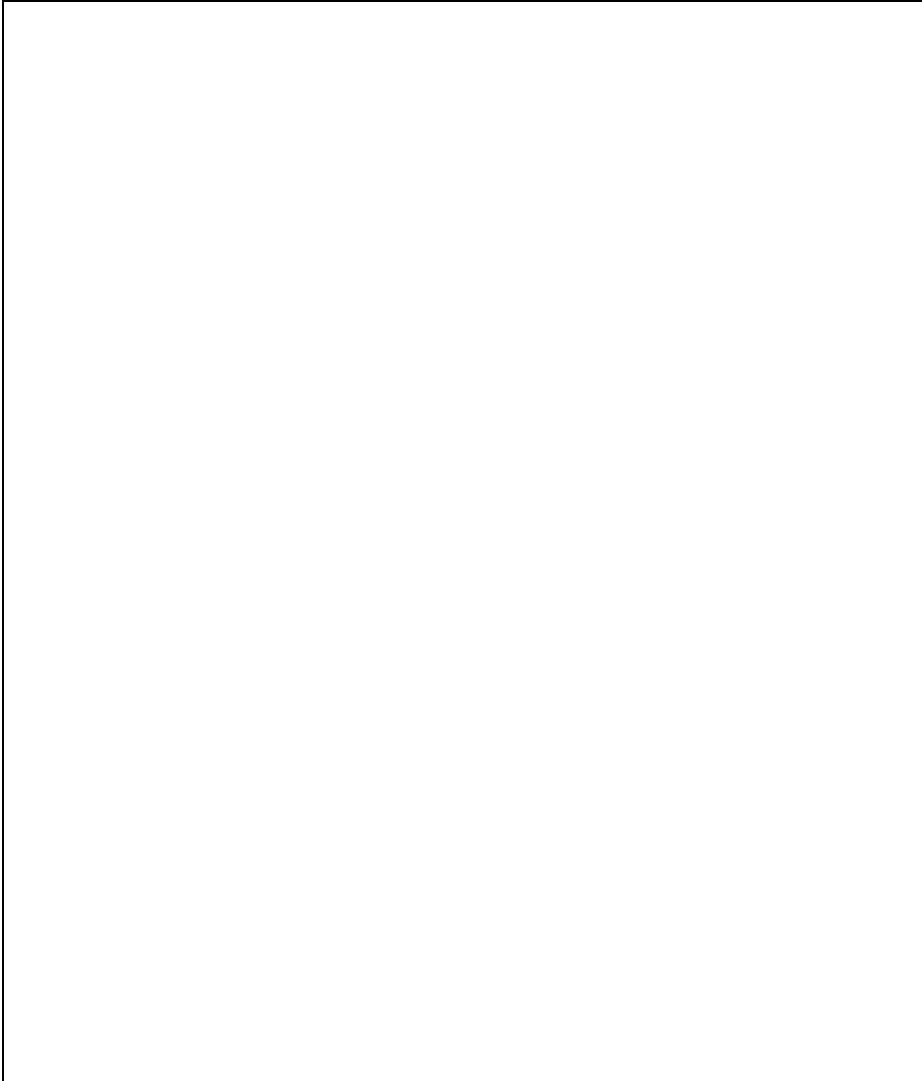
Case ID	
Grade	
Subject	
Date	
Duration	
No. of teachers attending	

I. Descriptive record of the meeting

- Things to note (among others)
 - Participant’s pedagogical purposes of the ICT use prior to the use
 - Potential pedagogical issues or problems associated with the use of ICT
 - What the participant thinks about the outcomes of the use
 - Participant’s questions/appreciations
 - HoD’s feedback and the participant’s responsiveness to such feedback

II. Reflexive records of the meeting

- Things to register (among others)
 - Methodological issues
 - Questions
 - Personal reflections
 - Things that need to be reviewed on the video



Appendix 11. Semi-structured interview guides

I formulated each interview script after the class observations. I generated questions from the theory and the data collected. Therefore, each script differed from one another. The interview guides were also modified during the conversations. I generated a priori questions that intended to capture ideas regarding reflexive practice, CPD, agency and ICT. In the interview, the informants' responses enabled me to add, modify or remove questions.

Case 1 interview guide

“Thank you very much for participating in this research project. Before starting with the interview, I would like to know if you have any questions about this research and agree to be audio-recorded. Please remember that your answers will be used anonymously, and your name will not be publicly disclosed. I will begin with some questions about the reflexive practice model you have been leading for a while.

1. Could you tell me more about the reflexive practice model of your institution?

Probes:

- How does it work?
- Could you tell me how does the model work in your department?
- Are there any policy documents that guide your observations of the practice and your conversations with the teacher? Would you like to share them with me? Only if you can or if you feel comfortable to do so. There's no pressure at all.

Thank you very much. Now, I will formulate some questions concerning this particular case.

2. How do you usually develop the process of designing a lesson plan?

Probes:

- Do you make the lesson plans together?
 - If you decide to use an ICT, how do you usually choose it?
 - Do you follow the national Curriculum? How does it relate to your decisions regarding the selection and use of ICT?
 - I was also able to see that he delivered a printed version of the PPT, is it a good example of that?
 - And what about the teaching for understanding framework (TfU)? Do you see any synergies?
 - That reminds me to the fact that you focused your discussions more on disciplinary and pedagogical issues than on the ICT itself. Would that explain what you said before?
3. Concerning the RP session, could you describe what happened there? Are there any specific points that draw your attention?

Probes:

- Could you explain further, for instance, concerning his reflections about the use of ICT?
- That reminds me to one situation that I saw...? Is that a good example of what you are saying?

Thank you very much for this insightful conversation. Before ending this interview, would you like to ask or add anything else?"

Cases 2 & 6 interview guide

"Thank you very much for participating in this research project. Before starting with the interview, I would like to know if you have any questions about this research and agree to be audio-recorded. Please remember that your answers will be used anonymously, and your name will not be publicly disclosed. I will

begin with some questions about the reflexive practice model you have been leading for a while.

1. Could you tell me more about the reflexive practice model of your institution?

Probes:

- How does it work and for how long has it been running?
- Do you know why the school offers the possibility to have the RP meetings?
- Are there any policy documents that guide your observations of the practice and your conversations with the teacher? Would you like to share them with me? Only if you can or if you feel comfortable to do so. There's no pressure at all.
- Could you tell me how does the model work in your department?

Thank you very much. Now, I will formulate some questions concerning the cases of your department.

2. It is my understanding that this is the first year of development of project-based learning (PBL) framework in your department. Could you explain how that model has been developed throughout this year?

Probes:

- Could you explain further, for instance, how has this framework been articulated with the RP model of your institution? And with the Teaching for Understanding Framework (TfU)?
- Or, how have these teachers applied and reflected about their ICT practices within the frameworks?

3. From the observations, I was able to see that you will have an ICT fair on the 21st of November. Could you please tell me more about the fair?

Probes:

- What is the purpose?
- How have the teachers worked in its design and implementation?
- Have you made any changes to the original plan? Have the RP meetings played any role in its development?

4. Concerning the RP meetings of the teachers observed, could you describe what happened?

Probes:

- I know it's been a long time, but do you remember anything special? What topics were addressed?
- Is it generally like this? I mean has this year been almost always discussions associated with the fair?
- Could you tell me more about the reflections made by these two teachers about their ICT use?
- The nature of both courses is quite different. First, one teacher taught ICT that are better known and used by students. On the other hand, the second teacher taught something quite new (i.e., programming). How did you feel about coordinating these two courses as an HoD?

Thank you. I would like to conclude this interview with a final question.

5. Would you like to ask or add anything else?

Thank you very much”.

Cases 3, 4 & 5 Interview guide

“Thank you very much for participating in this research project. Before starting with the interview, I would like to know if you have any questions about this research and agree to be audio-recorded. Please remember that your answers will be used anonymously, and your name will not be publicly disclosed. I will begin with some questions about the reflexive practice model you have been leading for a while.

1. Could you tell me more about the reflexive practice model of your institution?

Probes:

- How does it work?
- Could you tell me how does the model work in your department?
- Are there any policy documents that guide your practice observations and your conversations with the teacher? Would you like to share them with me? Only if you can or if you feel comfortable doing so. There’s no pressure at all.

Thank you very much. Now, I will formulate some questions concerning this particular case.

2. How do you usually develop the process of designing a lesson plan?

Probes:

- Do you make the lesson plans together?
- If you decide to use an ICT, how do you usually choose it? Based on what criteria?
- And concerning this unit? Or is it always the same way?
- In your opinion, what was the objective of using the videos for this class? What role did it play in practice?
- Do you follow the National Curriculum? How does it relate to your decisions regarding the selection and use of ICT? And concerning the TfU framework?

- I remember that you told C3 something about planning and the TfU, something like: “You worked in the second dimension, which is acquisition of knowledge - and in the second phase, which is the organisation of knowledge because you made a scheme”. Is that a good example of articulation between design-ICT-TfU?

3. Concerning the RP session, could you describe what happened there? Are there any specific points that draw your attention?

Probe:

- I remember that you commented on the video in two areas: the technical and topics related to the subject area. Do you usually do that when they use ICT?
- That reminds me of one situation I saw during the RP; you commented several times that the videos were excellent resources. What would you highlight about them? Is there anything you think could be improved? How do you think it could?
- Regarding their reflections on difficulties (for example, the lack of time to make ICT work), how do you usually come up with a solution?

Thank you. I would like to conclude this interview with a final question.

4. Would you like to ask or add anything else?

Thank you very much”.

Appendix 12. Supplementary evidence to C2 & C6

Theme	Evidence
Teacher-centred ICT use.	HoD: “Conversely, the PowerPoint displays what I should tell her. Let’s say, visually or directly. Besides, we deliver a printed version of the PowerPoint to each student. And we read the PowerPoint before the class, so we know what we expect for that question, what we imagine that could happen. (...) So, the PowerPoint cleans the lesson plan, which is focused on the teacher, only with the contents that we believe that the students should look at, learn, reflect, analyse. So, in that sense, the necessity emerged only for that purpose” (C1's HoD interview ⁴³).
Traditional spatial configuration. ICT’s pedagogical background: TfU.	“HoD: You worked in the second dimension, which is acquisition of knowledge and in the second phase, which is the organisation of knowledge (...) you asked them to move the chairs towards the whiteboard [<i>the video was projected on the whiteboard</i>]” (C3, C4 & C5’s reflexive practice meeting observation).

⁴³ Please note that this HoD was also C2.

Theme	Evidence
Distributed spatial configuration – learner’s paced temporal configuration	“C2 continued with the same dynamic of leaving each pair working independently and supervising their progress. When each pair was ready with the programming phase and transferring the instructions to the robot, the teacher supervised their testing on the rug. Some completed the task correctly; others did not. When they did not achieve it as expected, C2 asked them to think about what might have gone wrong and try to solve it [<i>I recorded short videos of the robot moving over the rug</i>]” (C2’s class observation).
Linear temporal configuration.	“C3: I missed the opp... HoD: But, but the resource was used very well. And I wrote: ‘Do not rush. It doesn’t matter if you cannot watch all the videos. The important thing is the good use of the resource’” (C3, C4 & C5 reflexive practice meeting).
Dialogic social configuration.	“C5 stopped the video and asked: ‘What zone might be this?’ A student replied: ‘The Northern Zone’. The teacher asked: ‘Why? How do you know it is the Northern Zone?’ [<i>while walking to the right side of the room</i>] She gave the word to another student. The student replied: ‘Because it is dry’. C5 continued: “Because it is dry, very good” (C5’s class observation).

Theme	Evidence
Collaborative production.	<p>“He approached the same pair of students who asked for help initially and noted: ‘This work is very good. Excellent job’. Staring at another team in the same row, he noted: ‘This project is good’. One student of the same row raised her hand. She was seated near the camera. He asked another student to close something [<i>it seemed to be a video game or something that wasn’t associated with the purpose of the session</i>]. The student argued that they had already completed the task. The first pair of students asked them how he preferred to save the written text [<i>i.e., in what format</i>]. The teacher replied: ‘In MS Word or if you prefer you can share it through Google Drive’” (C6’s class observation).</p>
Ways in which the reflexive practice policy is operationalised.	<p>“In those sessions [<i>i.e., the HoD’s extended meetings with the Deputy Headteacher</i>] we discuss more contingent topics, school policies, information that they need us to notify the teachers. So, if you ask for a document, I would say that we only have that leaflet, in relation to the RP meeting. For the observation, we have an observation sheet with specific drivers that indicate to what we should pay attention” (C1’s HoD interview).</p>

Theme	Evidence
	<p>“The idea is that, through the reflexive practice meeting, the team nurtures from the experiences of their colleagues. So, it is a rich instance. It should be a learning instance. You know, to say: 'look, this is the class of the first teacher. It began in this way. This could be useful. This didn't work as expected', you know? Something, something like that. We review timing; We review assessments; we review lesson plans; we review the materials designed for students” (C3, C4 & C5's HoD interview).</p>
<p>ICT use to carry out teachers' IRP.</p>	<p>“(…) we work together; it also happens that in the hallway, during the recess or by chat, we resolve those details because in those two hours we cannot resolve them” (C1's HoD interview).</p> <p>“(…) the meeting notes are uploaded to Google Drive. I share the folder with them. Anyone who wants to make a comment or a petition: 'This should go' or 'this shouldn't go' it's also permitted. All those things are shared via Google Drive. As we have difficulties to ran into each other. We did the same thing to prepare the fair. And it has worked quite good” (C2 & C6's HoD interview).</p>

Theme	Evidence
ICT use to carry out teachers' IRP.	<p>“(…) the coffee time, the instance of discussing, that we are so close to each other has been good. That physical space has been good for that kind of being able to transfer experiences. And during the year we have had 4 classes, I mean 4 classes, 4 meetings that we have called the ‘extended department meetings’. They have been longer encounters, I’m thinking of 2 or 3 working hours that we have been all together. Those experiences have also been great. We share topics such as ‘how am I implementing the PBL?’ ‘What things have worked and what haven’t?’” (C2 & C6’s HoD Interview).</p>
IRP skills (dialogue and collaboration).	<p>Those 4 meetings of the year have been great from that point of view because we have, we have been able to hear each other and, given that this is knew, ultimately, we have been able to, ehm, we have been able to rest a bit on the idea that ‘they are doing it well’ or ‘they are doing it wrong’, you know? Something like ‘it also happens to me’” (C2 & C6’s HoD Interview).</p>

Theme	Evidence
<p>Teacher's agency. HoD's vision about the role of the teacher participants regarding their ICT practices.</p>	<p>"But, finally, I like to empower them. You know? They own their classes, their courses. They know the dynamics of their courses better than anyone. They know how the students relate with each other. They know the rhythms. I don't know. The implicit part. They know, they handle it very well. So, they must feel with the freedom of, of using that knowledge for the final common good, which is that the students learn. You know?" (C3, C4 & C5's HoD interview).</p> <p>"HoD: At this point, you missed a deeper discussion about the New Year's celebration. C3: The thing is that I'm not familiar with the Mapuche New Year's celebration. Thus, I didn't want to tell them a fake story. HoD: Ah, ok. Then, it is better to skip it" (C3, C4 & C5 reflexive practice meeting).</p>
<p>Teacher agency - Feedforward.</p>	<p>"He picked up the chair to model the differences between the positive and negative energy. He asked the students when is it positive or negative. Then he carried the book to explain when the energy becomes zero [<i>null</i>], because that kind of force does not add energy [<i>he seemed to do this because the images projected on the whiteboard were too small</i>]" (C1 class observation).</p>

Theme	Evidence
Teacher agency- Feedforward.	<p>“C1: Right. A thing that happened is that one student who was seated in the first row didn’t saw, in the third picture of the cases.</p> <p>HoD.: Oh</p> <p>C1.: It was too small. I don’t know if only for her, but she didn’t understand first, but it was because she didn’t saw that arrow.</p> <p>HoD.: Oh.</p> <p>C1.: But that’s the only thing.</p> <p>HoD.: [<i>he opened the PPT and to check the image</i>] Yes, it is over the area surface</p> <p>C1.: Right.</p> <p>HoD.: Maybe, if there’s time, I will write down here ‘improve image’ or ‘find other pictures’” (C1’s reflexive practice meeting).</p>
Teacher agency – improvisation.	<p>“As much as we plan something, afterwards in practice, the variables are so much, to avoid saying countless, the teacher may improvise, although it sounds bad, he/she improvises according to what happens in the class. He/she adapts and can answer to the question of the student, and if that is written in the lesson plan, then the other [<i>the other teacher</i>] can anticipate that situation. So, that’s the way in which we share things” (C1’s HoD interview).</p>

Theme	Evidence
Teacher agency – different use of the same ICT resource.	<p>“HoD: Although, it depends on the criteria of each teacher. It varies, so, maybe C4 stopped the video on the cultural explanation of the Mapuche traditions (...) But then each one decides. C5 didn’t display the entire video of the Mapuche culture. So, the teacher decides and makes choices because you cannot use the entire resource” (C3, C4 & C5’s RPM).</p>
Ecosystemic IRP.	<p>“(…) the backup from above, I mean, with everything that you can imagine, I mean, we had to implement a workshop with a project that involved a lot of things, I mean, materials, we never had a ‘no’, ‘it’s not possible’, ‘there’s no money’, everything, everything. So, in that sense, we always laugh and say: ‘we are the most loved’” (C2 & C6’s HoD interview).</p> <p>“We dialogue quite a lot with Sciences. I think that it’s the subject with which we work the most. It has been simpler this idea of making our department interdisciplinary. But we’ve been developing joint ICT projects with Arts, with Spanish, and with History.” (C2 & C6’s HoD interview).</p>

Theme	Evidence
Ecosystemic IRP.	<p>C4 continued while C3 connected the speakers to the laptop. “From what they have to protect themselves? What falls a lot in the Southern Zone?” [and she used her hands to imitate rain]. A student said: “From rain?” The teacher agreed. Then, she asked for a student’s attention. C4 walked towards C3 and said: “See, these are the problems of ICT”. One student said: “But technology is very good”. IR replied: “I consider myself quite techie, but sometimes technology beats me”. Then, C4 walked towards the computer. The audio of the video finally worked [The audio problem lasted 5 minutes]. Then, C4 thanked C3, asked her students to thank her, and all the students thanked her out loud together. C3 left the room (C4’s class observation).</p>
	<p>“Look, in general the decisions are made by the team, with the schedule at hand. With the minimum requirements that are suggested, because at some point, the suggestions come from the Deputy Headteacher: ‘Hey, we should be more flexible with this’, ‘We should give more time’. And we try to cover the most content we can. And always as a team” (C2 & C6’s HoD interview).</p>

Theme	Evidence
Ecosystemic IRP.	<p>“By connecting this challenge with Physics, he explained what would happen if a person gave the instruction 1 or 0 [<i>with 1 the person instructs to make an action, while with 0, the instruction is not to take any action at all; therefore, with 1, the robot would move and with 0 the robot would stay still</i>]” (C2’s class observation).</p>
Ethical dimension and teacher agency.	<p>“The one about the Onas. I didn’t watch it before the class. I’m not sure that it would have passed through my filter. I found it quite violent (...) I understand that these girls are exposed to a different world than ours, that they watch violent things at home. But here, I think that we need to pass things through some sort of filter. And I’m not sure if this resource would have passed through mine” (C3, C4 & C5’s HoD interview).</p> <p>HoD: “Then I wrote if the video would be a bit violent considering the learner’s age. But then we discussed it with C3 and in fact they had seen it before” (C3, C4 & C5 reflexive practice meeting).</p> <p>“Notes after the observation: The HoD approached me (...) She mentioned that she found the last video quite violent and not appropriate for 2nd grade students” (C3 class observation).</p>