The role of ICT in supporting the academic and social development of pupils with educational behavioural problems within primary schools in England

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The dissertation is submitted for the degree of Doctor of Philosophy in Education

I, Abdullah Ciftci, 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.

Acknowledgments

For everything that has a start, there is an end. The day that I was dreaming about hopefully arrived. This journey was a challenging but rewarding.

First of all, this is a journey that is shared with supervisors. So, big thanks must go to my supervisor, Dr Evangelos Himonides for believing in me and most importantly supporting me since day one. We had a very supportive and positive relationship. Special thanks to my second supervisor, Dr Ross Purves, who joined us lately, but his contribution was very valuable. He was also always there when I needed his support and expertise.

I would also like to send my gratitude to the Ministry of Education, Republic of Turkey for providing full scholarship for my PhD. And a dream came true.

I am indebted to the participants of this study as they made it possible to collect such valuable data that provided an in-depth understanding of the role of technology for education. Some headteachers were very supportive in terms of reaching out teachers, so I am thankful to their support.

During this journey the PhD community in Institute of Education was very supportive and we had many great conversations that helps to be a scholar. There were many PhD friends that nourished my mind, I am indebted. Moreover, there were many friends in London that without their friendship, London would be an unbearable place, both economically and socially. I met with many great people during this time, so I see it as a valuable impact of this journey on my life.

This was a very stressful period of my life and without the support of my family, this journey would have a disastrous impact on my mental health. Big thanks to my father, mother and siblings for the ongoing support. I had doubts about myself, but they kept believing in me. Special thanks to my wife Suara as she faced similar difficulties with me during this journey. She was a friend for accompanying difficult but important journeys. Also, luckily, for last three and half years, I had a source of

inspiration and love, my daughter Meryem. She was the hope during the hopeless times.

Abstract

This study's aim is to understand teachers' use of technology in their daily classroom activities and offer an in-depth and critical look at the role of technology within this context. The study is centred on the education of pupils with SEND and behavioural problems, their academic and social skills development, collaboration with peers, and the overarching concept of effective teaching and learning. Teachers' accounts of everyday classroom use of technology is being explored to build a theoretical, pedagogical, and practical understanding of educational practice that involves technology as an intrinsic component of the classroom. As technology continues to evolve, educational praxis and pedagogy change alongside it; it is therefore important to explore what the role of technology is, as reported by practitioners in mainstream schools within an intensive and particularly challenging urban context.

In this mixed-methods study, 140 primary school teachers (primarily from Greater London, UK) participated in a survey and 12 practitioners (7 teachers and 5 Special Educational Needs Co-ordinators [SENCOs]) from primary schools were interviewed. A blended analytical approach was taken in the analyses of the datasets. Analyses of the data centred on the systematic mapping of participants' views in relation to technology's affordances, collaborative learning and effective teaching.

Participants showed awareness about the need for self-regulation for maximising educational gains with ICT-based education; they also demonstrated awareness about the particular needs of pupils with behavioural problems particularly regarding self-regulated learning. ICT was accepted as a force for good as well as bad as teachers argued that pupils were distracted, and at the same time they were engaged with the same tools. They, therefore, found adult guidance a necessity to make sure that pupils use ICT in appropriate ways. There was positivity towards ICT among participants, but they did not necessarily feel that they used ICT effectively for their teaching practices. The multimodality nature of ICT is very prevalent in the pedagogy of teachers as teachers use a plethora of digital resources such as websites that provide videos, slides, games and graphics for particular topics.

Collaborative activities were mostly limited to creating supportive materials (e.g. slides and presentations), so collaboration that supports problem-solving skills and the development of metacognitive skills was reported as typically absent. Teachers need support in order to integrate a pedagogy that supports pupils to become independent learners. This is likely to be dependent on increasing awareness towards supporting self-regulating skills. This work brings a number of tangible as well as 'intermediate technology' notions such as ease of access, speed, connectivity, flexibility, multimodality, interactivity, remote control, online a/synchronous presentation, and the feeling of newness together as critical components the interweaving of which shapes effective pedagogy using ICT.

Impact Statement

Observing UK's educational system throughout my PhD journey has been a rewarding experience because I was able to observe and critically assess cultural, political and economic differences in terms of educational praxes between such diverse contexts like Turkey and the United Kingdom. Inclusive education is a significant topic in the UK, concerning educational achievement based on all needs, and personal circumstances. ICT is seen to play a significant role in fostering inclusivity and accessibility for pupils with different abilities. The aim of this study is to explore teachers' use of technology in their daily classroom activities and offer an in-depth and critical look at the role of technology within this context. It is essential to analyse the rationale behind technology-based practices and their educational value in terms of improving teaching practices. ICT integration involves beliefs towards each technology and the understanding of teachers has an impact on the decision they make. Hence, this study generated data from teachers via an online questionnaire and face-to-face interviews to invite teachers to reflect on how they position ICT for their profession.

This study has demonstrated the importance of looking at the interrelatedness of concepts such as technology, pupils, collaboration, classroom and effective teaching, all of which were found to be valuable when it comes to understanding educational practices. Framed around themes such as technology, pedagogy and pupils with behavioural problems, this work emphasises the need to go beyond our common understanding of education. In the review of related literatures, it was demonstrated that technology is ubiquitous, and it is an intrinsic part of education and pedagogy to be informed by technological change. This study also demonstrated that although there is limited creativity around the use of ICT, it is an intrinsic part of teachers' pedagogical practice as well as everyday life.

This work demonstrates that the integration of ICT is an ongoing process that requires teachers to make decisions on the impact of new technologies. Participants' educational practice is not always informed by evidence-based research, so there

should be more training and skill-based courses around the pedagogy of ICT. Teachers' collaborative practices are often limited to the production of supportive materials (e.g. slides or posters), so teachers are often appearing to lack knowledge of using ICT for the development of metacognitive skills and project-based or problem-based learning. When it comes to pupils with challenging behaviours, teachers see ICT as a motivational tool, but they also reported many problematic behaviours such as overuse, bullying and off-task behaviours. This study also shows that self-regulating skills, a part of executive function, training needs to be developed further, given the time that students spend on their own using technology.

This work also highlights the important role of the wider educational communities and how these should support teachers during decision-making, particularly when they integrate novel tools into their practice. Teachers' positivity towards ICT is not reflected in their practice and it is not only due to lack of knowledge, skills and infrastructure, but also due to limited access to useful resources and examples of effective use of ICT. Effective teaching requires trained teachers with sufficient resources. This study offers appropriate and systematically acquired evidence that supports the need for a change in how ICT is implemented and used effectively in the classroom and also the need for employing an extensible praxis that looks at the underlying structures of the use of technology instead of specific ephemeral tools.

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1. Introduction

1.1 Setting the scene

Since the Salamanca Statement (1994, a UNESCO conference that led to *Salamanca Statement and Framework for Action on Special Needs Education*), inclusive education has been a much-debated topic (Ainscow et al., 2019). Pupils with special educational needs and disabilities (SEND) who need extra support due to their special condition, have been included in mainstream schools to eliminate social exclusion and promote equality by celebrating diversity in the classroom (Magnússon, 2019; Ainscow, 2005). Based on this idea, it is believed that inclusive education is most beneficial and suitable educational setting for pupils with SEND, therefore they were prompted to go to mainstream classrooms. However, educators now are more focused on assessing each case individually and in some cases inclusive education can be very effective for some pupils, but in other cases special schools can be more effective based on specific needs (Florian, 2019). The main consideration is how a child can get the most out of the education, so instead of fitting them in an existing paradigm, a system that will suit their needs best will be considered.

'Inclusive education' is based on the idea of providing a supportive and adequate education for all in order to combat discrimination at every level of society, especially in education (Kauffman et al., 2018). Inclusion, however, is a controversial issue that has prompted debate around what constitutes the most supportive educational setting for pupils with SEND (Florian, 2019; Hornby, 2015). Schools must be able to deal with challenges such as behavioural issues, learning difficulties, and developmental problems in order to increase success in learning, improve pupils' skills, enhance knowledge, support communication, and establish a positive relationship between pupils with and without SEND (Anastasiou & Kauffman, 2011). It is, therefore, essential to identify the teaching strategies that will facilitate effective inclusive practices (Ainscow, 2005; Booth et al., 2002; Florian, 2019).

In the classroom, pupils with SEND can display behavioural problems due to unmet needs and may struggle with their learning. The SEND Code of Practice (Department for Education, 2015) for the UK explains that behavioural, social and communication issues are prevalent among different SEND groups. Students with learning difficulties and other SEND groups can also display behavioural problems when they are not engaged in educational activities, as disengagement is one of the main causes of behavioural problems (Reichenberg, 2018). General behavioural issues are also prevalent in the educational environment in relation to classroom management, learning activities, and pupils' general needs (Närhi et al., 2017). Thus, in regard to inclusion, behavioural problems have an impact both on the classroom environment and on overall achievement regarding pupils with and without SEND.

In the everyday classroom, technology is employed to support pupils with different learning needs; it is a ubiquitous and taken-for-granted part of education (Oliver, 2012; Selwyn et al., 2017). It is utilised to customise and visualise education with clear learning objectives and a vast volume of educational content (Kearney et al., 2018). Teachers have found technology helpful to their teaching, and it has been seen as an engaging tool for use with pupils with attention problems, for instance ADHD (Bikic et al., 2015). For pupils with autism, it can reduce social and behavioural problems by allowing them to, engage with peers through game-based social learning, or it can be used as a supportive learning and communication device (Holt & Yuill, 2017; Malinverni et al., 2017). For pupils with learning difficulties and dyslexia, technology provides colourful and structured learning materials, improving their access to learning; consequently, they tend to demonstrate fewer behavioural problems (Abtahi, 2012; Zikl et al., 2015). Technology is at the centre of classroom learning with the use of tablets and interactive whiteboards (IWB) which afford possibilities for content manipulation and multimodal representation with a touch screen that can be saved and revisited when needed (Mercer et al., 2010). The concept of Web 2.0 indicates that users can create, interact and share on the internet as in the case of social media in contrast to the previous operation of the

internet which was one-way content publishing (Campbell, 2019). It also represents a fundamental shift in education, as, ideally, learners become more active by creating, criticising, and collaborating instead of simply passively acquiring someone else's ideas (Male & Burden, 2014).

Indeed, collaboration has become a theme commonly associated with interactive digital activities, as collaboration can be most effectively promoted and facilitated with technology (Dafoulas & Shokri, 2016). Users of technology interact with either software or other users, which increases the opportunities for collaboration, as we are leading to an era that collaboration with machines is a reality (Luckin, 2018). Unlike machines, teachers can become tired, so teaching-wise machines are seen more desirable. Interactive educational programs create opportunities for unlimited and flexible learning; however, there is a risk of this becoming the new normativity that creates new barriers while removing old ones (Houlden & Veletsianos, 2019; Mercer et al., 2010). On the other hand, collaboration between pupils has been found to be a significant aspect of classroom learning, as pupils need to learn how to interact with their peers and gain social skills. Full participation of all pupils can be achieved by creating dialogue and collective reflection, which can be facilitated with the interactivity that technology provides (Kennewell et al., 2008). Having an understanding of pupils' emotional and social needs can further increase the effectiveness of collaborative activities and reduce behavioural problems (ibid.).

An inclusive classroom is multifaceted and involves pupils with SEND, communication technologies, interaction with peers and teaching strategies. The harmony between these aspects is expected to promote effective teaching activities, which are at the centre of all educational research. Therefore, when it comes to technology, there are theoretical frameworks which aim to provide a guide to the effective integration of information and communication technologies (ICT), a concept that define the internet-related technologies (Web 2.0) like smartphones and applications (Bardakci & Kocadağ Ünver, 2020) . The Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009; Phillips, 2016), is developed on Pedagogical Content Knowledge from Gudmundsdottir and Shulman

(1987). Koehler and Mishra (2009) confirmed that technology is becoming a significant part of educational practices, therefore, they integrated technology into the existing framework. This demonstrates the importance of technology in increasing the effectiveness of teaching, and shows why it has become an everyday part of the classroom (Ertmer & Ottenbreit-Leftwich, 2010; McKnight et al., 2016). Different theoretical frameworks focus on different educational aspects, all aiming toward the effective integration of technology; however, many of them include human–computer interaction, which affords new opportunities, such as the ASSURE and the ICARE models, which are discussed in the literature (Wang, 2008).

Another theory that can help to understand the role of technology in society and in the classroom is affordances theory, which focuses on the possibilities of a mediated action through use of a tool. However, tools are socially constructed; they have material properties that enable specific actions (Hammond, 2010). In regard to educational technology, one of the most commonly applied learning theories is the constructivist approach, as technology allows the construction of learning by design (Robinson & Sebba, 2010). Teachers integrate ICT to mediate learning by using pupils' and their agency in such a way that participants appropriate the devices based on their needs (John & Sutherland, 2005). ICT can facilitate didactic teaching strategies, which include presenting visual information using IWBs, as well as allowing a student-centred constructivist approach that includes interactive activities and application of knowledge in different contexts (John & Sutherland, 2005). It has been argued that if pupils have access to learning materials such as visualised content, structured learning applications, and educational games, they will interact and collaborate, which in turn will lead to learning ((Kirschner & Merriënboer, 2013; Slavin, 2018). Pupils do not simply consume what is on the internet; they create, recreate, appropriate, and publish online, which includes the construction of knowledge and the creation of a network of learning in the online space (S. Bennett & Maton, 2010; Selwyn et al., 2017).

Teachers have reported that technology is also a motivational tool for pupils with and without SEND; in a recent study, students remained on-task for longer, and worked

more independently and effectively with technology (Tobar-Muñoz et al., 2017). Although there is a positive discourse around the motivational impact of technology, teachers need support to integrate ICT effectively into their teaching so that pupils' learning is supported (Phillips, 2016). The discourse suggests that technology will transform, even revolutionise, pedagogy and the classroom (Passey et al., 2004; Selwyn, 2016). Teachers, therefore, need to change their teaching approach to facilitate personalised, student-centred, and collaboratively constructed learning for both pupils with and without behavioural problems. Within this context, teachers' positioning of ICT for their daily educational activities needs to be explored and analysed to gain a comprehensive understanding of the use of ICT in the inclusive classroom (Siddiq et al., 2016). Teachers have an understanding of technology and integrate it into their teaching by considering the context; however, ICT's impact on pupils' learning and behaviours creates an ongoing decision-making process for teachers as they aim to support pupils' learning effectively (Albion et al., 2015).

1.1 Rationale for the study

The current study's aim is to understand teachers' use of technology in their daily classroom activities and offer an in-depth and critical look at the role of technology within this context. It will attempt to arrive at an in-depth understanding of the rationale behind technology-based practices and their educational value in terms of improving teaching practices. These themes will be specifically linked to the education of pupils with SEND and behavioural problems, their academic and social skills development, collaboration with peers, and the overarching concept of effective teaching. Teachers' accounts of everyday classroom use of technology will be explored to build a theoretical, pedagogical, and practical understanding of educational practice that involves technology as an intrinsic component of the classroom. Educators are investigating what technology, especially mobile devices such as iPads, can do to make education more mobile and flexible (Beauchamp et al., 2015; Lu et al., 2017) because with these devices the 'school' exists on digital platforms. As devices continue to change, educational institutions and pedagogy

change alongside them; therefore, a comprehensive analysis of daily use of technology in the classroom, where the central themes of this study overlap, is essential and valuable.

Technology is employed by teachers throughout the whole process of learning; they use it while planning learning activities, and in the classroom for presenting information and administering those learning activities. Although the introduction of devices such as iPads is recent, teachers and students have integrated them into their lives to the extent that they are seen as an expected feature of the classroom (Tay, 2016). Indeed, in UK primary schools, technology such as IWBs and tablets are widely used (Gillen et al., 2007). Yet this pervasiveness is not evidence that the use of ICT in education is effective (Falloon, 2015; Warwick & Kershner, 2008). It is, therefore, essential to analyse how teachers incorporate ICT in their daily practices and to understand the decision-making process used in regard to applying ICT for supportive educational activities for pupils with different learning needs and behavioural problems. As such, the conceptual framework of this study is built around the themes of SEND, behavioural problems, ICT, collaboration, and effective teaching. It demonstrates that there is a deficiency in evidence-based literature in recent years of providing a comprehensive picture of the use of technology for supporting pupils with behavioural problems' learning.

From the initial engagement with the literature for the purpose of this study, the initial aim was to understand teachers' use of technology in their daily classroom activities and offer an in-depth and critical look at the role of technology within this context. This aim reflects the multifaceted nature of the classroom in light of the themes mentioned above, facilitating an in-depth analysis of the phenomenon under study. This overarching aim led to the development of three questions: (i) what is the role of ICT in fostering the social and academic development of pupils with behavioural problems in mainstream primary school classrooms? (ii) how is ICT applied in these classrooms to improve collaborative work between pupils with behavioural problems and their typical peers? and (iii) how do teachers think that ICT can support the improvement of their teaching practice?

1.2 Design of the study

The initial engagement with the literature and the nature of the research questions led to the decision to adopt a mixed-methods research design to enable the collection of the rich data required for an in-depth analysis of the phenomenon. The philosophical underpinnings of the mixed-methods research design and tools will be discussed in detail in the methodology chapter (Chapter 3).

A questionnaire was designed to gain a broad-level picture of the use of ICT in the Key Stage 2 (in English education system, year 3, 4, 5 and 6 of primary school) classrooms and gauge teachers' general understanding of educational technology. Key Stage 2 (KS2) teachers were asked Likert-scale questions also called rating scales that participants indicate the level of agreeing and disagreeing (Cohen et al., 2013). The questions were related to their perceptions of the use of ICT for engaging and supportive educational activities, the degree to which it is useful for their teaching, and the role of visuals in learning. Furthermore, open-ended questions were also included to enable the collection of qualitative data for more in-depth analysis.

First of all, the questionnaire was distributed in London schools via email to invite teachers to participate in, but the turn out rate was low; therefore, it was distributed via an email list that found on the internet all around England. There were a few participants from Scotland as well. In total, 140 participants completed the questionnaire, and with this low turnout rate, this number is a success for the research. After that the collected quantitative data was statistically analysed using the SPSS software. The qualitative data was then analysed to identify themes that needed to be investigated further. Limited and short-sentence responses to open-ended questions made it necessary to interview teachers to explore in more depth the issues related to the use of ICT and the advantages of integrating it in their teaching. Seven KS2 teachers and five primary school special educational needs coordinators (SENCOs) were interviewed so that the themes that emerged from the survey could be triangulated with qualitative data. The data was analysed to inform a

theoretical and practical understanding of the role that ICT plays in inclusive classrooms and the behavioural implications of its integration in the classroom.

1.3 Overview of the thesis

The next chapter will present a review of related literatures on the topics of SEND, inclusion, and behavioural problems. It will focus specifically on behaviours and learning needs in the classroom, and discuss the pedagogy of ICT in the classroom and the features that allow multimodal representation, mobility, flexibility, and interactivity of ICT-based learning.

In the methodology chapter, a critical approach is applied to reflect on the philosophical standpoint of the research. Following that, the choice of methodological approach will be explained and justified to increase the trustworthiness and rigour of this research. As a mixed-methods study, the first phase of the research was quantitative and qualitative survey data analysis; in the following phase, qualitative interviews were conducted, and the gathered data analysed using interpretive phenomenological analysis. This chapter will provide detail about the data collection process, participants, methods of analysis, and ethical issues.

In the results chapter, a statistical analysis of questionnaires was provided to identify the emerging patterns in the data. Subsequent interview data analysis provided further clarity on the role of ICT in the classroom and teachers' decision-making regarding the integration of ICT into educational activities. Cross-referenced themes provided insight into the role of ICT in supporting the learning of pupils with SEND and behavioural problems, collaboration between peers, and the role of ICT in increasing the effectiveness of educational activities.

The discussion chapter then proposes critically evaluates the answers to the research questions, referencing the philosophical underpinning of the study, literature, and theoretical frameworks. It presents the quantitative and qualitative findings and compares them with previous related studies. The current study refers

back to the existing literature in analysing the role of ICT in the everyday classroom and how teachers reflect on their ICT-based practices based on the prevalent discourse.

The last chapter provides the conclusion of the research, and discusses the implications for practice, theoretical understanding, and further studies. It focuses on the ongoing challenges of adopting new technologies into the classroom and the impact of these technologies on changing pedagogy. The chapter concludes by discussing the limitations of the study, including sampling and the choice of methods.

2. Literature Review

This study aims to understand teachers' use of technology in their daily classroom activities and offer an in-depth and critical look at the role of technology within this context. The concepts are behavioural problems, social and academic skills development, and collaboration with peers. The national focus of this study, therefore, is mainly Britain and the literature review argues the role of ICT in British educational setting. To this end, the present chapter reviews the relevant literature on the phenomenon of technology, in which the dominant discourse is that ICT is the solution to all educational issues and, as such, there is positivity around ICT; however, this thesis argues that integrating ICT into educational practices is not sufficient to provide effective teaching (first research question). This problematise this discourse as it is discussed in introduction as well.

This literature review will focus on discussing the challenges that pupils with autism, attention deficit and hyperactivity disorder (ADHD), emotional and behavioural problems (EBD) face in the classroom and how technology can be used to engage them in educational activities, support their learning and improve teaching practices. The chapter is analysing the literature related to the central themes of this study, which are SEND, behavioural problems, ICT, collaboration, and effective teaching. Links between these themes will be established throughout the chapter, as they are all significant aspects of an inclusive classroom. The literature review will focus on the role of ICT in the classroom to support pupils with SEND and behavioural problems, and will then analyse educational theories including affordances theory, constructivism, and behaviourism (first and second research questions). Analysing these theories is essential to gain an in-depth understanding of the role of ICT in education and it will provide basis to improve teaching practices (third research question). Theoretical frameworks for the integration of ICT, such as TPACK, will also be analysed to provide a theoretical basis for teachers' accounts of their daily ICT use. The theoretical perspective and background that underpin this study, as set

out in the literature on education and technology, will be used to make meaning out of the complexity of education and the everyday classroom.

2.1 Inclusion and Special Educational Needs and Disabilities

In the context of education, inclusion is the process of increasing the participation of students with additional needs and enhancing equality in the learning environment (Booth et al., 2002). Inclusive education is built on social justice theory, which aims to remove barriers to increase social mobility and decrease exclusion and segregation (Terzi, 2014). However, schools can face difficulties adapting and modifying the curriculum and pedagogy to meet all pupils' needs; consequently, inclusion itself can lead to exclusion when those needs are not met (Florian, 2019; Fuchs & Fuchs, 1994). Thus, ensuring access to mainstream education is not by itself sufficient for inclusion; to be fully inclusive, schools must employ inclusive educational activities based on pupils' needs and create a supportive and welcoming environment (Booth et al., 2002). Inclusion, in this sense, is about specialising the education and assessment of every student by considering their specific condition and needs (Florian, 2019).

The scope and extent of inclusion can be identified by understanding which types of students are included, and what their special educational needs are. It involves inclusive education policies, inclusive school culture, flexibility of pedagogy, ongoing evaluation of practices, and adaptation of new educational tools (Booth et al., 2002; Bruin, 2019). Inclusive education is, therefore, not aligned with the idea of one system, curriculum, and pedagogical approach – 'one size does not fit all' has become the motto of inclusive education supporters (Hornby, 1999). However, inclusive education itself can be presented as the 'ultimate solution' for pupils with SEND, which can overlook some specific needs for the sake of inclusion, especially when the education system is not well-designed (Norwich, 2013). Inclusion is not equivalent to simply being under the same roof as peers of all abilities and needs; students are at school to be educated, not just included (Reindal, 2010). Inclusion is, therefore, about pupils' learning, their academic and social skills development, and

their opportunities for learning, and it should be considered prior to integration of ICT as well.

Effective inclusion is the combination of identifying the barriers to learning, taking all students into account, creating a welcoming environment, sharing responsibilities between staff, avoiding stigmatisation, labelling, and discrimination; and creating a flexible curriculum (Booth et al., 2002; Florian, 2019). The language of discrimination and stigmatisation have a negative impact on inclusion, and changes in terminology have been made to reflect that having special needs is a condition rather than a weakness or disease (G. Lindsay, 2003, 2007). The discourse around inclusion reflects 'a shift from a needs-based to a rights-based agenda' (Lindsay, 2007, p. 3-4) following the rise of postmodern ideology (Kavale & Forness, 2000). While inclusion has an ideological standpoint, integration is more neutral. The discourse of inclusion aims to increase participation of disadvantaged pupils and include people from different socio-economic classes in mainstream society or schools to increase the equality of opportunity for people of different backgrounds and ethnicities (Florian & Black-Hawkins, 2011). The ideological standpoint of the right to be educated with peers in mainstream classrooms does not suggest that inclusive education is more effective than special education schools (Florian, 2019). Failure in inclusive practices stems from teaching strategies, teachers' knowledge and skills, and school policies (Lindsay, 2003; 2007). Thus, if children have an 'unequal natural capacity', inclusion would constitute the removal of barriers to their learning (Lindsay, 2003).

On the other hand, effective inclusive practices depend on the performance and positive perceptions of teachers towards inclusion (Avramidis & Norwich, 2002). Teachers have a significant responsibility for implementing inclusive educational practices (Jordan et al., 2009). Teachers with no experience of inclusion tend to have a negative perception of the integration of pupils with SEND (MacFarlane & Woolfson, 2013), By contrast, teachers with experience of inclusion have a positive perception and are more willing to improve their skills and implementations with the support of local authorities (ibid.). The perceptions of teachers change depending on whether it is easy to manage pupils with SEND in their classrooms, which shows that

their understanding of inclusion is limited (Kavale & Forness, 2000; Pickl et al., 2016). Environmental factors, such as support from headteachers, having specialist teachers, and accessible buildings for students with SEND, also have an impact on teachers' perceptions of inclusion as a positive thing (Pickl et al., 2016; Wilson et al., 2018). These factors suggest that taking into account the different levels of skill can lead to better results for inclusive and special education, and that schools should be reconstructed to accommodate students with diverse needs (Ainscow, 2005; Azorín & Ainscow, 2018).

Teachers play a key role in employing inclusive educational practices (Boer et al., 2011). Moreover, there is a relationship between positive belief in and successful inclusion; therefore, training on the positive benefits of inclusion and how to improve teaching practices towards inclusion plays an essential role (Cameron, 2017). Effective inclusion practices might increase the integration of children with special needs and their overall achievement (e.g., improved skills, social integration, autonomy, and a positive sense of self) (Lindsay et al., 2014). Although most teachers support inclusive education, there can be differences of attitudes in terms of age, experience, and sex (Vaz et al., 2015). This indicates that while teachers' awareness of inclusive and special education might be increased, they could still find educating students with special needs to be challenging practice; thus, it might decrease their willingness to implement inclusive teaching. Teachers have expressed their support for the idea of inclusion, but some abstain from the actual practice of inclusion (Boer et al., 2011). This is an indication of a lack of training and practical background, making teachers unwilling to teach students with severe disabilities (Ruijs & Peetsma, 2009).

Studies of inclusion suggest that pupils from mainstream schools demonstrate more improvements compared to their peers who are separated (Jordan et al., 2009). Furthermore, students without special needs also benefit from inclusive education because teachers who have students with SEND are more able to specialise and individualise the teaching activities (ibid.). The schools which espouse inclusive practices may improve the outcomes for all students by adopting different

approaches to teach different skills (Hornby, 2014). However, personalisation of education can increase the demands on the teacher because they are required to consider different needs and apply different teaching approaches to support all pupils in the classroom (Farrell, 2000; Hornby, 2014). Inclusion supports the development of social skills, but pupils need further support to improve academic skills. However, Farrell (2000) suggests that, if a teaching process is designed around supportive and engaging teaching methods and materials, pupils can improve their academic as well as their social skills.

Comparing inclusive and special schools gives rise to ethical concerns because it assumes that children from different ability groups in different schools have the same characteristics (Farrell, 2000; Florian, 2019). It is difficult to generalise one study to another; therefore, qualitative research helps to make better sense of the uniqueness of the phenomena. Qualitative research on special education aims to understand a specific situation in a particular context, or to make sense of the situation using an interpretative method. In a sense, it is like taking a picture of phenomena to frame, and to examine or determine the uniqueness and commonness of the phenomena (Brantlinger et al., 2005). By contrast, quantitative research aims to take a general understanding of the context and identify trends in the educational setting for inclusive and special education. In terms of what can be used to fulfil the aim of the present study, combining both traditions of research can provide new angles to explore a multifaceted phenomenon, which can help to deepen the understanding of inclusion and SEND (discussed in details in methodology chapter).

2.2 Behavioural problems

In the educational context, behavioural problems cause management issues in the classroom and delay in educational activities (Farmer et al., 2014). Behavioural problems can stem from the symptoms experienced by pupils with autism, attention deficit hyperactivity disorder (ADHD), emotional and/or behavioural problems, and many other labels used in the American Psychological Association (APA)'s

Diagnostic and Statistical Manual of Mental Disorders (APA, 2013). In addition to DSM-5 classified 'disorders', there are further behavioural problems demonstrated by pupils with additional learning needs, such as learning difficulties and developmental difficulties in the education context. When the needs of those pupils are not met, it is more likely to lead to behavioural problems because the typical lesson is not designed to engage them. In England's SEND Code of Practice (2015), the SEND groups are: autism; 'speech, language and communication needs' and 'behaviour, emotional and social difficulties'; and learning difficulties. Moreover, there are general behavioural problems seen in the classroom, such as misbehaving and distraction from learning; in inclusive school settings, these are behavioural implications of SEND groups (Ewe, 2019; Santos et al., 2016). In this section, ADHD, autism, EBD, and general behavioural problems will be discussed in order to facilitate an understanding of the full spectrum of behavioural problems in the classroom, as challenging classroom behaviours can take many forms.

As an additional point of note, there is a possible risk of psychiatric difficulties for children with intellectual disabilities compared with their typical peers (Emerson, 2003; Stoesz et al., 2016). Intellectual disability refers to an individual experiencing issues in reading, mathematics, or spelling during their early years of schooling. No differences in terms of the prevalence of intellectual disabilities have been found between special and inclusive school students. However, there is a relationship between psychological and intellectual development; for instance, Emerson (2003) argues that punitive child behaviour management practices by parents might have adverse outcomes on child intellectual development. Also, a large number of students with autism have intellectual difficulties that can be supported with early intervention (Dawson et al., 2010), so if their psychological needs are met, it will have an impact on their cognitive development. Understanding the implication of behaviours of pupils with SEND and behavioural problems in general will lead to creating a need-sensitive educational framework that consider all components which are part of this study's conceptual framework.

2.2.1 Autism

Autism is a developmental disorder that causes learning difficulties and behavioural issues such as obsession with routines and hyper-sensitivity (Carter Leno et al., 2019; Frith, 2001; Weir et al., 2020). Although autism is something that can be diagnosed biologically with genetic tests, the assessment relies on behavioural criteria, including 'qualitative impairments in social and communicative development, with restricted and repetitive activities and interests' (Happé, 1999, p. 216). However, Happé (1999) argues that the relationship between behavioural task failure and cognitive deficit is ambiguous, because a child might fail a test for many reasons, such as lack of attention, motivation or task comprehension. The main indication for identifying autism is based on the 'theory of mind' perspective on autism, which focuses on the ability to infer what other people are thinking in order to predict and explain their behaviours, or understanding other people's minds (Frith, 2008; Kotroni et al., 2019). The theory of mind account of autism can explain why children with autism display difficulty with simple behaviours, such as joint attention (paying attention to what other group members are working on during collaborative activities), pretend play, and even telling lies. In this way, 'the theory of mind account of autism has been of enormous theoretical and practical benefit in understanding, recognising and addressing the social and communicative difficulties in this disorder' (Happé, 1999, p. 217).

The word autism derives from the Greek word 'autos', meaning 'self' (Frith, 2003), and reflects the observation that pupils with autism are self-centred and have difficulties in understanding others' emotions. They may also have difficulties in reciprocal social interaction, which results in problems understanding and reacting to others' emotions (Böckler et al., 2016; Kanske et al., 2016; Frith, 2008). Another difficulty pupil with autism face is communication, particularly in acknowledging the message in real-time as the communication is happening and interpreting facial expressions and gestures. Another common symptom is restricted and repetitive activities and narrow interest, which can lead to isolation from social life. These

symptoms create behavioural problems during interaction with other people in the classroom as well as at home and in general social life. Autism can, therefore, cause behavioural issues in the classroom and teachers need to find ways to deal with these challenges (Renty & Roeyers, 2005).

Autism can present from a young age, and early interventions can be employed to deal with symptoms early on. For instance, the sensitivity of pupils with autism to their surroundings begins when they are young, and effective intervention and professional support can reduce some of the associated behavioural issues (Frith, 2008). Early intervention has also been found to be critical to their development, as it improves social and communication skills. It is important to be aware of their specific needs and employ the right approach to support their development. Social stories and mobile applications are commonly used to improve these students' skills and decrease behavioural issues, enabling them to participate in social life effectively. When pupils with SEND are adequately supported, this will aid their integration to social life.

Pupils with autism have difficulties in executive function and recognition of emotion in others, and in controlling their behaviour towards a goal and this is the case for pupils with attention deficit and hyperactivity disorder (ADHD), a topic to which I will return below (Berenguer et al., 2018; Buitelaar et al., 1999). Joint attention is also a significant issue; when there is a need for joint attention to an object, children with autism have difficulty simultaneously paying attention to an object and interacting with their peers (Charman, 2003). Another aspect of executive function, discussed previously, is known as 'mind-reading', whereby when another person takes an action, the observer can predict their intention by reading the context (Frith, 2001). In this way, the theory of mind is a prerequisite for executive function (Perner & Lang, 1999).

Executive function is significant for pupils with autism as well as ADHD. Both groups can have difficulties in executive function, which is one of the reasons for comorbidity (Berenguer et al., 2018). Difficulties with executive function create behavioural and

social problems because of a lack of the skills that required for interaction (Roselló et al., 2017). This impacts autistic students' school readiness and their learning, which later causes learning difficulties; therefore, educational approaches need to target the improvement of executive function (Pellicano et al., 2017).

2.2.2 ADHD

In the UK, ADHD is a clinical term, but in the educational context, it falls under the umbrella of behavioural, emotional and social needs. To diagnose ADHD, the APA manual recommends observing a child's behaviour to identify the prevalence of three symptoms: inattention, hyperactivity, and impulsivity (DSM-5, APA, 2013). If the individual displays six indications for each symptom within six months, the diagnosis is ADHD (Barkley, 1997; Weyandt & DuPaul, 2013). The 'predominantly inattentive' type of ADHD is characterised by a lack of attention to detail, difficulties in sustaining attention in tasks and playing, not listening when spoken to directly, being easily distracted from activities, and difficulties in following instructions and organising activities (DSM-5, APA, 2013). Another type of ADHD is 'predominantly hyperactive/impulsive', characterised by talking excessively, inappropriate running in school and at home, fidgeting with feet and hands, inability to stay sitting down, difficulties in engaging in activities quietly, impatience when waiting their turn, and interrupting conversations and activities inappropriately (ibid.). The third subtype is 'the combined type', which is a combination of the two previous types that includes symptoms of inattention, hyperactivity, and impulsivity (ibid.). The alternative diagnosis manual is the World Health Organisation's International Classification of Disease ICD-10 (WHO, 2008), which classifies ADHD using similar symptoms (Loe & Feldman, 2007; Walter et al., 2015)

The process of diagnosing ADHD is based on a psychological assessment of the child by interviewing parents and teachers or the child and rating their behaviours according to checklist scales (Anastopoulos & Shelton, 2001; Barkley, 2015) Behavioural screening measures are used to determine the severity of the level of inattention, hyperactivity, and impulsivity. For example, a computerised version of

the ‘Tower of Hanoi’ task has been used to determine the level of inattention (Weyandt & DuPaul, 2013). There are alternative ADHD assessment methods that observe children through a rubric or survey. According to Barkley (2015), the standard ways of assessing ADHD are parental interview, child interview, teacher interview, child behaviour rating scales for parent and teacher, self-report behaviour rating scales, adaptive behaviour scales and inventories, peer relationship measures, parent self-report measures and direct behavioural observations. Tests for reading, maths and language skills – to identify the functional condition of a child with ADHD – are also important for a comprehensive assessment of ADHD (Weyandt & DuPaul, 2013).

The existence of symptoms that overlap with other SEND groups, such as conduct disorders and oppositional disorder, has led to the critique of overdiagnosis and misdiagnosis of ADHD (Sciutto & Eisenberg, 2007). The overdiagnosis critique argues that there has been a ‘tsunami of diagnosis’ of SEND (Langager, 2014). This then leads the stigmatisation of an increasing number of behaviours because, in every update of DSM, additional labels are introduced. The stigmatisation of so many of children’s behaviours can make the situation more complicated due to the in increase in the number of classified disorders in every DSM update. Thus, although labelling can help this group of pupils to be treated appropriately, it can also lead to stigmatisation (Toye et al., 2019).

Hyperactivity, impulsivity, and inattention distract pupils from learning, which has an impact on achievement and more general development. However, it is not only these three symptoms that can give rise to behavioural difficulties; Barkley (1997) argued that problems with brain function, especially impairments in executive function, cause cognitive impairments. Attention is a part of the cognitive domain that has an impact on learning. The relationship between attention and learning affects ‘the ability to sustain attention over time (vigilance), the ability to attend to stimuli selectively, the ability to alternate or switch attention stimuli or tasks, and the ability to divide attention so as to maintain more than one ongoing process’ (Kerns et al., 1999, p. 274). Barkley (1997) further explained that inattention,

hyperactivity/impulsivity, metacognitive skills, and executive functions have different impacts on pupils' performance. The lack of a clear dividing line between these aspects and their impact on behaviours reduces the possibility of creating supportive interventions (Tarver et al., 2014).

2.2.3 Emotional and behavioural problems

The term emotional and behavioural disorders§ (EBD) is used within the social theory of SEND, which argues against the medicalisation of some behaviours (Cooper et al., 2012). Criticism was result of the anti-psychiatry movement which were in rise in 1960s and 1970s in Britain and other places that focused on criticising highly medicalised psychiatry (Crossley, 1998). Although it does not offer a frame of reference (nominalist in nature), it embraces a self-reflexive awareness to enable criticism of hegemony of highly medicalised psychiatry (ibid). It therefore refers to behavioural issues that could be addressed with psychosocial interventions when considering DSM labels (Cooper et al., 2012). In educational settings, it is classified as general behavioural problems rather than used as a psychiatric label that implies the need for medication. In the UK, the label of behavioural, social, and emotional difficulties has been used to avoid medicalising the groups of students with behavioural and emotional problems. Instead, these are recognised as groups that need extra support in their education and reflects the shift from a medical to a social approach in the governmental reports on education (Cooper et al., 2012). The terms ADHD, emotional and behavioural problems, or social, emotional and behavioural difficulties are all used in the classroom (Maskey et al., 2013). There are similarities between these three groups such as difficulties in self-regulating as it will be discussed later.

A biopsychosocial approach is embraced by psychologist and educators for emotional and behavioural problems so that they can be comprehensively evaluated instead of viewing the problems as genetic (Cooper et al., 2012). Pupils are supported in different domains, and the dynamic interactions between natural, psychological, and environmental domains need to be considered together to enable

a holistic approach. The label EBD covers many pupils who are emotionally disturbed, and there is a lack of understanding of which are the lacking social skills that create difficulties in the classroom (Kern, 2015). In the literature, many SEND groups are identified; thus, it is challenging to gain a clear picture of emotional and behavioural problems in primary school settings (ibid.). Furthermore, it is argued that there has been an increase in anti-social behaviours that make classroom management more difficult for teachers as more pupils are diagnosed with behavioural problems (Lochman et al., 2015). As a result, teachers feel de-skilled when working with pupils with EBD, especially in supporting their academic skills development (Lane et al., 2005).

Social skill problems have been categorised into four general areas: self-control deficits, performance deficits, skill deficits, and self-control performance deficits (Maag, 2005, p. 157). This indicates that there are overlapping domains between these categories and ADHD, EBD, and autism; thus, including these categories and behaviours of SEND groups under behavioural problems will help to put behavioural problems into an educational context and reduce the vagueness of the term. Lewis et al. (2010) suggest that, to facilitate effective support, sustained interventions are required to promote the social and academic skills development of pupils with EBD. Teachers need to understand the challenging behaviours of this group of students, improve their skills and provide ongoing feedback and technical support to the school (Kern, 2015).

Behavioural and social problems are prevalent among other SEND groups, specifically speech and language difficulties (Lindsay et al., 2007). In the current study, therefore, the focus is on behavioural problems, but is not specific to ADHD or autism. These behaviours, however, vary based on the specific conditions of each group. Pupils with EBD typically have poor academic and social skills, and are more often suspended because of their behaviours as Vannest et al. (2009) argued in their review of academic interventions available for pupils challenging behaviours. Pupils with behavioural problems need additional academic and social skills support. Less attention is paid to academic skills by teachers in addition to supporting social skills

(Lane et al., 2005). In the current study, however, a comprehensive approach was employed because in the educational context, these problems interact, and it is difficult to separate them.

2.2.4 Executive function

Executive function is 'the ability to free the mind of the immediate situation and context to guide behaviours through mental models or internal representations' (Bogdashina, 2005, p. 50). In the context of ADHD, difficulties in executive function manifests as shifting attention when there is an immediate stimulus in the environment and leaving the task unfinished; for autism, examples include difficulties in stopping before they finish the task, even if they need to stop (Berenguer et al., 2018). Barkley (1997, p. 72) identified four essential domains of cognitive (executive) function for ADHD: 'working memory, internalisation of speech, self-regulation of affect-motivation-arousal, and reconstitution'. Impulse control, goal-directed behaviour, cognitive flexibility, strategic planning, behavioural inhibition and working memory are all related to executive function (Barkley, 1997; Weyandt & Gudmundsdottir, 2015).

Pupils who have deficiencies in executive function demonstrate poor performance in working memory, which results in difficulty retrieving the stored information and using it for further tasks and information processing (Hill, 2004; Roselló et al., 2017). It also causes difficulties in numbering forward and backwards, as well as time perception. Working memory training, therefore, plays a crucial role in educating pupils with behavioural problems and will help them remain on task by retaining information and accessing task-related information during tasks (Johnstone et al., 2010). Executive function efficiency will increase concentration, reduce undesirable behaviours and, hence, improve academic and social skills in terms of both quantity and quality (Houghton et al., 2004).

It has been found that difficulty in one of the many areas of the brain can result in communication problems and social skills deficits (Hill, 2004). However, there is a

criticism of linking executive function to autism and theory of mind, arguing that they are related to different domains of the brain. A further criticism is that executive function theory contributes little to the understanding of autism (Roselló et al., 2017). However, executive function and theory of mind can help to understand the cause of behaviours and their symptoms in the classroom. Theory of mind and executive function are related to the function of the brain, which is significant to social encounters that require joint attention and understanding the minds of others (Berenguer et al., 2018). Hughes et al. (1998), however, claimed that children with behavioural disorders such as ADHD and conduct disorder (CD) which is related to persistent patterns of disruptive behaviours (Turner et al., 2018), have no difficulties in understanding other minds, but do have difficulties in understanding others' emotions. Pupils with autism also have difficulties in understanding others' feelings and emotions. A study by Perner & Lang (1999) demonstrated that there is a specific developmental link between the theory of mind development and executive functions such as self-control. Experiencing difficulties in controlling behaviours makes pupils with behavioural problems unpopular in the classroom; their peers see them as a less likely friend. Furthermore, they are highly likely to be less favourably labelled by their teachers in terms of behaviour, intelligence, and personality (DuPaul et al., 2011).

2.2.5 Behaviours in the classroom

As discussed above, challenging behaviours can stem from psychological and/or developmental causes that typically fall under one of the labels listed in the DSM-5. Teachers have also reported general challenging behaviours that make classroom management more difficult, interrupt education in the classroom, and cause relationship issues between peers (Hutchings et al., 2013). In the school context, teachers have reported that one of the most common behavioural issues they face in the classroom is hyperactivity and difficulties in peer relationships (Pritchett et al., 2014). The neighbourhood, school, family, and culture that pupils live in shape their behaviours, implying a link between socio-economic background and psychological

developments; indeed, teachers in deprived areas have reported a higher occurrence of classroom management issues (Pritchett et al., 2014). However, reports of disruptive behaviours in the educational context have increased generally, regardless of socio-economic background (ibid.).

Behavioural issues in the classroom, as reported by teachers in several studies, include making noise and unnecessary remarks, talking out of turn, and disrupting others through chattering, nonverbal noises, and fiddling with equipment (Didaskalou & Millward, 2001; Hopman et al., 2018). In addition, more severe misbehaviours can be observed in the classroom, such as pushing, hitting or kicking peers, using bad language, and refusing to follow rules (Roache & Lewis, 2011). Effective teaching strategies, classroom management skills, and positive relationships with pupils can help to reduce this misbehaviour (Gordon, 2001). If pupils' educational and personal needs are met, they are less likely to misbehave and disrupt education in the classroom (Stoutjesdijk et al., 2012). Thus, introducing supportive educational tools and implementing effective teaching strategies will change the atmosphere in the classroom and make the teacher's role easier (Tsouloupas et al., 2010).

There is a relationship between challenging behaviours and low academic achievement, such that pupils who display challenging behaviours tend to have poorer English and mathematical skills (Hirn & Park, 2012). Gender is an influential factor; it has been found that girls with attention and emotional issue are less likely to have a significant gap in their academic achievement compared to their typical peers (Mundy et al., 2017). It is claimed that effective behavioural strategy and supportive classroom management that employs reinforcement and punishment logic have a negative impact on academic achievement (Hirn & Park, 2012). By contrast, the use of motivating educational materials and engaging, structured teaching programmes reduces misbehaviour and promotes learning. For behaviourists, technology is a stimulus and reinforcer, and in contrast for constructivist it is the medium to experience life and construct knowledge as it will be discussed later in this chapter.

On the other hand, the poststructuralist approach to challenging behaviours, according to Laws and Davies (2000), leads to teaching children that they have a choice in how to behave. The understanding of learning that this approach relies on is that pupils will learn to make good decisions and the right choices. Pupils will decide when, how, and why to do something, but with the understanding that there are consequences for every action. Positive behaviours are essential to conform to the social order to which all citizens act *automatically*. This relativist understanding avoids stigmatising behaviours and uses fewer labels by relying on a vague and individualistic understanding of norms and positive behaviour. The poststructuralist approach also requires the researcher to not be absolute in their judgement and to create space for alternative narratives. These narratives were welcomed into the mainstream sphere with rise of the antipositivist movement.

Challenging behaviours in the classroom are not only exhibited by pupils with autism, ADHD, or EBD; other groups with additional learning needs also display challenging behaviours when they are not engaged in educational activities. In this section, the link between behaviour and learning has been clarified to avoid seeing classroom behaviours as independent of teaching approach, classroom management, and the school's structure. Social skills are academic enablers and play a more significant role in the education of pupils with behavioural problems (Gresham, 2015). In the classroom, behaviours should be appropriately managed to create a supportive educational environment for all pupils. Behavioural problems can be a daunting challenge for teachers and, as a result, they have an impact on classroom education. However, with supportive educational strategies, interventions, resources, and tools, they will have an opportunity for learning, and technology can be employed to support their education (Allday et al., 2012).

The following section will focus on the use of ICT in the classroom to then discuss how ICT is utilised to support pupils with challenging behaviours. ICT is found as saviour for pupils with SEND and the affordances of ICT appeal to those who need extra support. Pupils with behavioural issues are engaged better with colourful and

moving content that are features that technology provides as it is discussed in detail in the following sections.

2.3 ICT in the educational context

Technology is ubiquitous and taken-for-granted part of everyday life and education that has become intrinsic in daily life (Ertmer & Ottenbreit-Leftwich, 2010; Kim et al., 2013). With Web 2.0 ICT is becoming a tool for interactivity where, rather than acquiring someone else's ideas, users experience and create their own understanding (Male & Burden, 2014). In many areas, especially education, ICT is seen as being a significant agent for change and improving pedagogical practices, as there has been positive discourse around its value (Bower, 2017; Wellington, 2005). The need to 'use it in the right way' is a common sentiment amongst practitioners and the public who view it as the solution to the problems of education (Regan et al., 2019). Innovative pedagogical practices, however, are not widely applied in the classroom, despite the positive discourse (ibid.). On the topic of ICT, the themes that emerge in the literature focus around the potential that ICT creates in the classroom, such as 'flexibility and versatility; multimedia/multimodal presentation; efficiency; supporting planning and the development of resources; modelling ICT skills; interactivity and participation in lessons' (Smith et al., 2005, p. 92)

These opportunities and potential that ICT devices create can be explained with affordances theory, which focuses on technology's impact on people's behaviour (Bower, 2017; Hammond, 2010). As it will be discussed in detail in theorising computerised education section, affordances theory is related to features, properties and opportunities of technology for action (Chemero, 2003). For example, desktop computers, tablets, IWBs, laptops, and any other ICT devices facilitate interactivity, connectivity, multimodal presentation, and content manipulation (Kennewell et al., 2008). For mobile devices (e.g. iPads or smartphones), however, there is an additional feature in their mobility and portability (Beauchamp et al., 2015).

This literature review will critically analyse the use of such devices in the classroom to avoid viewing ICT solely through a deterministic approach that assumes that ICT creates certain impacts in a mechanical way (Costa et al., 2019). The pedagogical practice of implementing ICT is shaped around the features that such technology (e.g., IWBs or mobile devices) provides, and that education can be improved through (Higgins et al., 2007). ICT, pedagogy and pupils with or without SEND are interconnected when it comes to education, so the aim is to make educational practices more effective.

According to Ottenbreit-Leftwich et al. (2010) teachers use ICT to facilitate classroom operations and organisation by creating customised classroom materials and engaging in professional development (searching for new ideas and resources). It also helps them to address student needs via: (i) engaging and motivating students (enhancing pupils' motivation); (ii) improving student comprehension and promoting higher-level thinking (representing topics and concepts visually, animation and video to increase comprehension – multimodality/ using the internet, teachers can introduce sources outside of the classroom, for example, video-conferencing); and (iii) facilitating technology skill development and transferring to future applications (in this highly digitalised era, pupils need to learn computing skills —while they learn ICT, they should also learn through ICT (ibid).

Learning can be achieved with the degree of motivation that keeps the learner at an optimal level of novelty and difficulty, and to making tasks relevant to personal interests as well as giving students choices and control over their learning (Beserra et al., 2019). Social interaction and collaborative work influence pupils' learning in a way that promotes critical thinking, taking responsibility for one's own learning, and the social construction of knowledge. Teachers have reported that having access to the course materials beforehand, such as prepared videos in the case flipped classrooms, helps pupils with SEND to learn at their own pace by considering their needs (McKnight et al., 2016). In McKnight et al. (2016)'s mixed-methods multisite case study, it has been found that 'shy, and pupils with SEND' communicate and engage in educational tasks more easily via online chat platforms and discussion

boards. Students can direct their learning and build their understanding of the topic by connecting with the world beyond the classroom via online technologies (Hall, 2015). The information available on the internet is sometimes perceived to be more current, rich, and engaging than textbooks. Some teachers have reported that online information widened students' perspective and that the vastness of the information available on the internet requires skill to evaluate its quality, one of the critical skills required in the internet era (ibid.).

Learning also takes place outside of the classroom; it is a form of education without walls and institutions, which is in line with the neoliberal notion of education as lifelong learning (Biesta, 2015). Here, the teacher is a facilitator, playing a role more akin to that of a midwife helping pupils to give birth to the ideas in their minds (ibid.). It is the use of technology in educational settings and the context is defined to apply the theory of educational technology. In the next section, the role of technology in and out of the classroom will be discussed in line of theoretical frameworks about the impact of technology on everyday life and specifically education.

2.3.1 Theorising computerised education

Technology is the application of scientific knowledge to nature to achieve or produce something. It has been accepted as part of the ongoing decision-making process and integrated in daily practice, however, technology is now so taken-for-granted that it has become the most 'natural' part of the world (Jandrić et al., 2018; Oliver, 2012). Being a ubiquitous and natural part of daily life could lead to determinism and reductionism (Derry, 2009; Yeaman et al., 1994) because there is a discourse that accepts technology as a panacea to all problems in education (Costa et al., 2019). It holds the belief that by using ICT certain result will be achieved. For example, Yeaman et al. (1994) observe that a number of assumptions have been prevalent since the invention of computers:

- 'The need for automated educational delivery systems is undeniable.
- Anything worth doing is done better on a computer.

- Schools and businesses need to buy more computers and the latest hardware and the newest software improvements to keep up to date.
- People who think that computers are awkward, dominating, imperfect, and sometimes less than useful need to be educated out of their computerphobia.
- Restructuring with technology and building information highways will end the perpetual education crisis.
- It is patriotic to promote technological dependency so that our countries do not lag behind in the competitive global marketplace.
- If we do not use more technology in education as part of our information infrastructures, we will regress into the world's first post-industrial societies that are founded not on information transfer but on agriculture.' (Yeaman et al., 1994, p. 12)

These ideas still resonate in the corridors of technology companies that advocate bringing more technology into the classroom to solve the problems faced in education (Selwyn, 2018). However, this deterministic approach puts too great an emphasis on the power of technology, which it cannot be resisted by individuals (Bennett & Maton, 2010). Determinists argued that education must change in line with technological force that is brought into society by every new technological device. Radical determinists claim that society has no control of technology whatsoever, that its effects are forced upon society (Selwyn et al., 2010). By contrast, the essentialist view holds the assumption that human capacity is enhanced when technology is used (Bayne, 2015a; Hamilton & Friesen, 2013). The essentialists argue that technology is revolutionising educational practice, therefore the changes that are brought about by technology should be embraced. However, there is a very limited room for agency, in terms of individual control over digital tools is minimal. According to Shirky (2008), it is like being pushed down a hill on a kayak, so that reversing or altering the direction in any significant way is impossible.

New generations, however, are willing to adopt these changes because they were born into a society that embraced technological devices (Bennett et al., 2008; Boyd, 2015). They are constantly connected to the extent that they do not merely consume

information, they create – and recreate – it. With the open systems, do-it-yourself, and hyperconnected network, pupils can play with existing materials or create new materials from scratch and republish the product (Somekh, 2007; Boyd, 2015). In the digital sphere, there is no gatekeeper or authority deciding what comes or goes. This discourse of an open internet with no gatekeeper privileges the student over the teacher, education, and knowledge, because it is built around individualism and emancipation from borders and barriers (Bauman, 2001; Houlden & Veletsianos, 2019). For Castells (2001), this is an example of 'networked individualism' whereby the internet provides opportunities for a 'new pattern of sociability based on individualism' (p. 130). People are connected through the network of technological devices, and individuals perform their agency on digital and connected platforms (Bennett & Maton, 2010; Houlden & Veletsianos, 2019).

Activity theory, also, focuses on the role of the human in computer-mediated activities where the focus is not technology but on what agents do with technology (Murphy & Rodriguez-Manzanares, 2008). This provides a lens through which to analyse the activity of an organism as mediated by a technological tool, where computers are the tools that mediate the interaction between humans and their environment (Costa et al., 2019). In this way, activity theory analyses human activity within its social context. Every component of the context, as a system, has a relationship with and interacts with each other component (ibid.). It studies every human activity in terms of how it is related to a specific tool and in its specific social context; thus, it analyses all components of human behaviour related to an activity as a system. It also analyses contradictions, the design of the learning process, change in behaviours and comparison of past and present, to understand the impact of technology. An activity as a system consists of subject, object, tools, community, division of labour, and rules, and the relationship between these; in this way, it focuses on systems rather than elements (Karanasios, 2018).

According to Bauman (2005), technology brings uncertainty and as a result removal of institutions because it aims to emancipate individuals from all bounds. The so-called democratisation of knowledge and the death of schools as gatekeepers

demonstrates that there are new roles in education. There has been a paradigm shift from the centrality of the teacher to the centrality of the learner, and from teaching to learning. The teacher is no longer the authority in the classroom; instead, they are a facilitator of learning, which is under the control of and the responsibility of the learner (Biesta, 2015). The constructivist approach, therefore, is compatible with the emancipation and personalisation discourse of technology. This is explained by Sutherland et al. (2008), who state that 'the teacher's role, at best, involves a complex shifting of perspectives from the 'more-knowledgeable-other' to the 'co-constructor of knowledge to the 'vicarious participant' (p. 6).

On the other hand, Selwyn (2016) argued that the politics and economics of technology are highly influential in educational technology. Technology cannot be separated from the ideology of the device, or from the production and distribution of the device. The economic and power structures behind the technology are brought into the school. There are also other theories, such as actor-network theory and community of practices, which aim to explain how social context impacts the use of technology and argue that technology is constructed within a particular social context (Blayone, 2019; Karanasios, 2018). Focusing instead on what people can do with technology, affordances theory aims to theorise technology by relating the features or properties of the technology and the opportunities it creates, to the practices that it mediates (Oliver, 2011, 2012). The affordances of ICT are found essential in supporting pupils with challenging behaviours because pupils with behavioural problems like to manipulate content on tablets.

Constructivism vs behaviourism

The constructivist teaching approach, is often positioned in opposition to behaviourism, which includes didactic approaches and programmed instruction that prioritise the acquisition of knowledge over the process of constructing it (Orlando, 2013). Behaviourism and constructivism are two different traditions; behaviourism focuses on the end product, with a learning process designed based on input and output (Ferster, 2014), learning that is observable through behaviours, and

supported by reinforcement and reward (Muijs & Reynolds, 2017). ICT embraced these two traditions because learning programmes are designed with behaviourist understanding, but at the same time supports the use of constructivist learning and student-centred approaches, and in terms of the characteristics of the instruction in ICT-based activities. The open-ended constructivist approach allows pupils to build their knowledge through inquiry and problem-solving (Vanderlinde et al., 2014).

There are two types of constructivism in the education context, social and cognitive constructivism, which each focus on slightly different aspects of learning, human beings, and social structure. For cognitive constructivists, knowledge is the result of reconstruction and accurate internalisation of external reality, based on the understanding that knowledge is constructed with new information and prior experience as an individual intellectual process. For social constructivists, however, knowledge construction is social and collaborative rather than individual; all experiences are part of a socio-cultural context that is mediated by discourse. Cognitive constructivism supports the idea that, using the same sources, individuals will construct knowledge differently; thus, the process of construction is closely associated to individual differences (i.e., strengths, intentions, motivation, attention, and needs). Social constructivism, however, focuses on the social design of a learning environment and collaboration/interaction between participants in the learning activities. Through interaction and information-sharing, especially ICT-based, learners co-construct the understanding that allows them to interact, communicate, and collaborate easily. Social constructivists are supportive of the use of ICT because they view learning as an interactive process of information-sharing, discussion, and negotiation (Wang, 2008) and technology can provide and facilitate this. Although the use of technology is seen as an individual act, technology is aimed at creating interaction between users regardless of space, time, and other barriers.

Tondeur et al. (2008) suggested that the reasons for differences in the integration of ICT in education contexts are teachers' skills, understanding, experience, and training. There are also differences in the level of integration because teachers who subscribe to the constructivist understanding are more likely to use ICT for more

complex activities, preferring to give students tools for learning rather than being their source of information. In the constructivist approach, pupils are encouraged to use online resources to make meaning of the subject matter; therefore, ICT plays a significant role in pupils' learning. Pupils need to evaluate the relevance of the available information, link available information, and create their understanding as well as being critical about the nature of the information. However, Reedy (2008) argued that simple use of technology, for instance presenting information and visuals to teach factual information, is in contrast to constructivist learning. Such practices aim to enhance pupils' necessary skills and knowledge through 'drill and practice' activities; however, in constructivist teaching, open-ended computer activities, such as educational games and exploratory programs, ought to be employed (Tondeur et al., 2008).

Pupils search the internet in the classroom and at home while doing their homework; however, this does not mean they are gaining skills and knowledge from these practices (Tondeur et al., 2008). Pupils use computers to search for information, but their use of ICT is limited for them to use it for further research on a topic after the lesson has been presented; therefore, teachers have been criticised for leaving pupils isolated and unsupported in the name of independent and constructivist learning (Sue Bennett & Oliver, 2011). Kirschner and Merriënboer (2013) disputed the idea that pupils are aware of their personal learning needs and style and that by structuring education to meet their personal needs and learning styles they will thrive through the use of digital learning tools. Allowing pupils to choose their preferred way to learn does not necessarily mean it will lead to effective education. Another assumption is that everything that a person needs to learn is available on the internet, waiting to be accessed, and that therefore there is no need to teach it.

Pupils in the current era are surrounded by ICT, especially in Europe and North America but there is inequality of access in other parts of the world as well as Europa and North America (Deursen et al., 2017). On the other hand, pupils are adapting mobile devices more; it is integrated into their daily life, and impacts their understanding of the world, and of the learning environment (Srinivasan, 2018). The

advent of ICT has brought about a pedagogical shift that increases the personalisation of learning and the curriculum, as devices can be used flexibly and offer a vast amount of options for practise (Underwood & Dillon, 2011). Constructivism allows pupils to choose the focus and pace of their learning, which is part of a student-centred learning approach. Explicit instruction, knowledge transmission, knowledge construction, and visualisation of the inputs and outputs for learning, help students learn to seek information and construct knowledge (Orlando, 2013). According to McKnight et al. (2016), learning is related to the instructional methods rather than the medium; therefore, if teachers do not use ICT in a constructivist way, whatever devices they are using will not make a difference to the outcome. ICT provides more options for learning resources, as well as greater richness and depth, and keeps the content current in a way that is not otherwise possible. Improving access has also been found to help teachers tailor and personalise learning for different learning needs, including for pupils with SEND (ibid.).

The role of ICT is thus to support new teaching in the classroom empowering pupils to teach themselves, though still with the help and guidance of their teachers (Prensky, 2008). Prensky (2008) argued that the affordances of technology are incompatible with the traditional teaching paradigm of telling and lecturing, as pupils become independent learners who can use the internet and have an awareness of their learning needs. Today's technology provides useful learning tools, and students can search on the internet to identify what is accurate, meaningful and relevant for them. These has led to a positive discourse around ICT where technology is argued to be driving a positive transformation of society; however, it also causes disruption and uncertainty, because of ongoing changes. Technology promotes constructivist teaching, and there has thus been a shift in the role of the teacher from lecturer to facilitator (Biesta, 2017; Mama & Hennessy, 2013; Vlieghe & Zamojski, 2019). One of the reasons for uncertainties is giving opportunities to the masses for recreating information, because it has created an amateur culture that gives voice to uninformed people, as Keen (2007) notes. The new role for teachers is better

understood with the rise of technology-based education, so the rise of constructivism has a direct link with the opportunities that are created by technology.

Affordances theory

As it is discussed above technology is about the opportunities that are created for practice and how people appropriate technology for their daily needs (Bower, 2017; Costa et al., 2019). The concepts of opportunities for practice and appropriation are discussed with affordances theory to analyse how technology mediate practice, specifically for pupils with challenging behaviour in KS2 classrooms (Bower, 2017; Chelkowski et al., 2019). Within affordances theory, the term 'affordances' relates to the impact, effects, or consequences of a medium, which can be perceived by users through the opportunities for action. The theory concerns how the device or tool is perceived based on its fundamental properties and the opportunities those create, which determine how the device can be used; for example, a knife has properties (e.g., a sharp edge) that can cause the event of cutting (Kono, 2009). For its usability, portability and multimedia features, for example mobile devices such as tablet are commonly used in supporting pupils with autism, ADHD and EBD (Chelkowski et al., 2019).

Affordance theory treats technology as given or neutral, which leads to determinism, implying certain consequences when using a device, which fails to consider how different groups use technology to advance their interests in different ways. In opposition to deterministic approaches, social approaches place humans at the centre of the analysis of technology-based activities; they are thus in alignment with constructivist, learner-centred approaches. However, although every user makes sense of technology differently, a device still creates opportunities for certain experiences. For example, users engage and communicate differently through digital devices. These devices were made for networking and connecting with people over space and time. If technology is not positioned as the cause of practice because the praxis is more complicated than having a list of effects that technology creates, then

it is invisible and natural (Oliver, 2012). It is seen as a natural extension of the human being.

Technology needs to be appropriated effectively in such a way that it will be visible as a learning tool, but invisible as a mediating technology (John & Sutherland, 2005). It is currently integrated into daily life in an effective way that makes it almost invisible, rather than an independent property of life when educating pupils with or without behavioural issues. Technology is an intrinsic, ubiquitous part of everyday life; thus, when used to mediate daily life, it becomes invisible and intrinsic. Technology is defined by what can be done with it, and thus is concerned with action, but it is studied separately from the action and the context. Chemero (2003) argues, therefore, that affordances are not properties of a device; rather, they are relations, and so are contextual. A situation demands or supports a certain kind of action based on the features of relations between the users and the device. Affordances theory, however, has a positivistic character because it assumes that 'things' have properties; these properties are independent of the user (invariants), even if they are defined contextually and relationally (Oliver, 2012). The social accounts of technology suggest including the ways in which technology has been produced, used, and interpreted in any analysis.

Technology is a cultural and value-based phenomenon, as education is. These social and cultural phenomena must be studied as processes rather than as artefacts (Amiel & Reeves, 2008). The politics of technology and education impacts on the practice; without considering the political, economic, and social dynamics involved, the intricately connected components of these phenomena will not be well-understood. Technology serves the particular needs of the hegemonic power, i.e. capitalist and state power, that seeks to maintain the status quo, rather than being neutral, open, democratic and autonomous. It interacts with the dynamics of the groups which create, utilise, integrate, and use it. The other political component of technology, which affordances theory can overlook by seeing technology neutral, is that it invites people to be connected all the time (Veen & Vrakking, 2006). Inviting

everything into the public sphere makes surveillance and control easier for those in power and is achieved through education and technology.

In the education context, teachers integrate technology into their pedagogy based on what technology affords for practice when they support pupils with SEND. Technology is closely associated with user-centred, constructivist, multimodal, and creative educational activities that are at the centre of SEND education. It has become a natural part of the student-centred constructivist approach to learning because it gives agency to learners, although it can be used in didactic approaches (John & Sutherland, 2005). In the classroom, when teachers are asked about their pedagogical understanding of technology, they cite the possibilities for action, which can be considered the functionality of technology rather than a deterministic force over action (Oliver, 2011). In the education context, it is the incorporation of technicality of technology and social reality of users and the aim is to give more control to the learner (i.e. pupils with behavioural issues) in a constructivist understanding of education.

In addition, in line with affordances theory, the 'instrumentation framework' focuses on the features of a tool, which is considered as not neutral but as having particular potential and capabilities. These potentials first can be equal to the artefact, the purpose of the design, that Sutherland et al. (2008) defined as the purpose of designing to accomplish a particular task. When a tool is used in a different task that was not the initial purpose of its design, it is appropriated and instrumentalised. Instrumentalisation takes place over a long period of use and activity. Therefore, integration of ICT is not straightforward and requires analysing the process of instrumentation, how it can be constructed in different ways and used to reach a target, for example supporting the needs of pupils with SEND. The pedagogical aspect of the process involves analysing how and why a tool is being appropriated so that the educational practice can be need-sensitive. The relationship between this theory and affordances theory is that the instrumentation framework appropriates the affordances of the technological tool (artefact). When bringing software into the classroom for teaching, there is a risk of seeing the software or tool purely as a

game; for instance, Sutherland et al. (2008) argued that pupils treat the software as a game and apply the rules of the game when they complete the teaching activity, it is commonly observed when pupils with behavioural issues use technological tools for education. The tool also brings with it its own culture, and it cannot be detached from the initial purpose of its design; thus, it is not neutral.

It cannot be denied that ICT has created unique opportunities for actions which were not available previously; therefore, it is a medium that has very particular impact on behaviour. Fu (2013) reviewed the literature on the impacts of ICT in education, and revealed that, for example, online sources could be accessed 24/7 anywhere with an internet connection, meaning that education is no longer depends on traditional printed materials. In this way, ICT makes knowledge more accessible, and knowledge acquisition a more engaging process. Even collaborative learning does not depend on being in a shared space (i.e., classroom) any longer, as pupils are connected to online educational and leisure spaces, such as social media platforms. Multimedia resources are commonly used in education, and having access to multiple sources supports a student-centred, self-directed/self-regulated approach. It also promotes creativity through purpose-designed applications that promote innovative use of ICT to meet educational needs. Therefore, promoting higher-order thinking skills (i.e., critical thinking) using interactive teaching methods and multimodal approaches will increase students' achievement.

Social networking is a product and extension of the internet which affords persistent production of content by users, visibility of that content to audiences, 'spreadability' of the content with ease of sharing, and 'searchability' to find others' content (Boyd, 2015). Moreover, it creates opportunities for accessibility, productivity/efficiency, equality, quality and measurability/evaluation. The most fundamental features of this technology are speed and ease of access and use. According to Boyd (2015), spreading a rumour, bullying peers, discrimination, inequality (of class and race), and attention-seeking are the traditional 'bad habits' of children that have been transferred to the digital world but with some differences – the online world enables these habits to be practised with greater speed and ease. The internet helps to reach

more people, and fast, enabling more harm to be caused. It is, therefore, essential to increase awareness of the use of the internet (inappropriate content; e.g., sexual and violent), particularly in regard to safety, cyber-bullying, privacy, and credibility as these features are result of increased connectivity and data-gathering (Selwyn et al., 2010). In the following sections, the features of technological devices like tablets or smartphones include usability, interactivity and connectivity, multimodality, and mobility will be discussed in detail.

Usability

The functionality of a technological device is central to the purpose for using it; therefore, the primary utility and value of the device is related to the opportunities that it creates for action, as discussed in the previous section (Wang, 2008). The concept of 'usability' is concerned with satisfying users through the accomplishment of tasks that the device promises, efficiently and effectively. Sufficient functionality must be combined with ease of operation for the device to facilitate efficient behaviours (Couldry & Hepp, 2016; P. Kirschner et al., 2004). Usability and functionality are significant in a technological society built on the idea of innovation; ease of use can be achieved by making the device, lighter and smaller; as a result, it is more portable, another feature that is prioritised. Indeed, Bauman (2013) argues that 'it is now the smaller, the lighter, the more portable that signifies improvement and 'progress'' (p. 13). According to Bauman (2013), being portable and the ability 'to be on the move' signifies freedom, which demonstrates that modern culture intersects with other concepts such democracy, freedom, technology, innovation, entrepreneurship, and capitalism (Han, 2017b, 2017c).

Ease of use concerns what technology offers people; therefore, its usability is rooted more in the discourse around technology than its functionality (Adams, 2006; Couldry & Hepp, 2016). Technology is expected to offer ease of use, speed, simplicity, and playfulness; for example, Microsoft *PowerPoint* offers user-friendly, default patterning. These features, however, foreclose other forms of knowledge representation that are not as easy to use. Adams (2006) claimed that through the

use of Microsoft *PowerPoint*, students can get the message that 'if it does not appear on a Microsoft *PowerPoint* slide, it is indeed not significant' (p. 399). It also sends the message that teaching is a presentation rather than a conversation as, with the rise of TED Talks, presentation is a means to learning; in TED Talks also, the presentation is more important than the content. The purpose of the design is related to its functionality; for example, Microsoft *PowerPoint* was designed for business. Each technology creates a new way of thinking, which orients the user to approach the world in a particular way. Through technology, we shape the world around us, and the things around us shape us (Han, 2017b; Postman, 1993).

Speed and ease of use are the main features and affordances of technology, with speed in particular being at the centre of modern society and culture (Bell, 2006). With the development and use of technology, speed gains even more importance in society, work, education, and relationships; the fetishisation of speed as a technological mindset sees speed as 'the hope of the West' (Kroker, 1992, p. 21). Baudrillard (1994) criticises this mindset as 'a path leading nowhere but leading there faster than the others' (p. 118). However, for technology, the end justifies the means, as the speed and ease of use justify surveillance and data capitalism.

Interactivity and connectivity

The first recognised feature of ICT is its ability to connect people, and when people are connected through devices, they interact (Dijck, 2013). The internet is used in education to connect the classroom to the outside world and make pupils active learners who are able to interact with the outside world (Male & Burden, 2014). The features of connectivity and portability further shift the focus from buildings and institutions to users, who can take their learning tools wherever they go. With connecting technologies such as the internet, schools are not the only places where education is taking place, and education is no longer bound by space. The new flexibility in space and time connects education to daily life and transcends institutions; thus, education is centralised on users and devices rather than teachers and buildings.

Interactivity also links with collaboration, as collaboration does not only take the form of peer-to-peer interaction, it also includes interaction between users and software (Luckin, 2018). In the learning environment, there are four types of interaction: learner–teacher, learner–learner, learner–content, and learner–interface (Wang, 2008). Interactivity includes encouraging, expecting, and extending pupils' contribution so that pupils will be active learners (Beauchamp & Kennewell, 2010). The aim is to achieve interactivity by transferring education to the digital sphere so that users can interact without being limited by time restrictions.

Students have a collective and mutual role alongside their teachers, and students improve different skills by increasing interactivity. A basic level of interactivity begins with watching-doing-using and then improves as it follows each step through constructing-finding, creating, exploring, and exploiting. The basic level occurs via a teacher-centred approach and progresses towards a student-centred approach that includes problem-solving activities, and reflective, analytical, and critical engagement with the topic of interest (Beauchamp & Kennewell, 2010). However, teachers prefer simple tasks as these are easier to manage; therefore, a straightforward task like downloading images from the internet and manipulating the content found easier for students and teachers compare to project-based collaborative activities (Selwyn et al., 2017). The language of technology is interactive and collaborative as it is designed to connect people on the open network.

Multimodality

Visuals have long been used in education, with teachers covering the classroom walls with eye-catching visuals that enhance the curriculum and display pupils' and teachers' work (Reedy, 2008). The computer program that presents visuals and attached text in slides called Microsoft *PowerPoint* is reported by teachers as being synonymous with the use of ICT in education (Baker et al., 2018). In the meta-analysis of Baker et al. (2018) of existing literature on the use of Microsoft *PowerPoint* they argued that teachers consider visual materials to be essential to their teaching activities; however, their use of visual resources limited to displaying

rather than using it to make pupils more autonomous learners and explorers. While visual representation has been revolutionising for teachers, according to one teacher, 'ICT can make a good teacher better, but it will not make a bad teacher good' (Reedy, 2008, p. 149).

In addition, there is a specific style associated with the use of Microsoft *PowerPoint* whereby information is split into slide-sized portions, and attention is shifted to the form and colour rather than the content (Reedy, 2008). Breaking information up into small 'chunks' makes it easier for pupils to digest, as the structure of the slides is more important than the content (Adams, 2006). Using IWBs for visualising content may encourage a presentational mindset, though users have pointed out that it can encourage pointless animation and ostentation. It can also discourage reasoning, complex thinking, and creative writing, and it is the specific impact of the medium on the practice (Koehler & Mishra, 2009). When using Microsoft *PowerPoint*, the teachers is the presenter of information, and Reedy (2008) argued that 'if knowledge is presented to students as a 'fait accompli' and as a series of objectives to be accomplished, rather than as something constructed or worked out through a demonstrable and reproducible process of reasoning, examining evidence, and use of logic, then the learning experience may inevitably be less rich and less meaningful for students' (p. 161). Such practices are, therefore, incompatible with supporting higher analytical thinking and the constructivist approach to learning, because the attention is on the form and presentation (Adams, 2006).

Multimodality and multimedia refer to the use of different forms media, such as visuals, texts and animation, and is considered by teachers to be vital to supporting pupils' learning (Wellington, 2005). Multimedia allows pupils to learn at their own pace, and, when visualisation is used appropriately and in the right context, motivates them to learn abstract concepts. Multimodal and multi-sensory representation of concepts helps pupils to remember what they have learned, and adds more features, such as animation, to traditional educational materials (Smith et al., 2005). Being able to manipulate visual learning materials engage pupils in the educational activity (Smith et al., 2005); however, engaging pupils behaviourally may

not necessarily result in engaging them cognitively. Visualisation and multimodal representations may result in 'dumbing down' the teacher's explanation to a series of bullet points (Hammond, 2010).

Images have begun to dominate the displays of learning resources, as educational materials become more image-based (Jewitt, 2010). This is reflected in an increase in colourful, image-based, graphical, and non-linguistic learning resources, and animated means of communication and representation. The commonly consumed media via videogames and social media reflect the current trend of visualisation (Jeong & Hmelo-Silver, 2016; Stenliden et al., 2019). This is due to technology being part of the semiotic process by providing access to means of semiotic production and creating new opportunities for visual communication (Kress & Leeuwen, 1996). The choice of modes for representing a curriculum concept shapes how it is constructed and the understanding of (what students know about) the concept. IWBs, for example, change the resources available in the classroom by providing access to the internet and enabling the visual representations of concepts. Having access to a vast range of multimodal resources means teachers can use visual teaching materials to facilitate pupils' learning (Jewitt, 2010). Manipulating and recreating visual and multimodal resources creates new opportunities for teachers in the contemporary world, in which everyday life is saturated with images and visual content.

Mobility

Mobility is a feature of mobile devices such as laptops, tablets, and smartphones; generally, pupils have positive attitudes towards the use of these devices in education, reflected in their being more motivated and engaged in learning (Sung et al., 2016). Unlike IWBs, tablets, laptops and smartphones are mobile and portable, and the symbolic and physical properties of these devices enhance the modern understanding of education (Hammond, 2010). These features have been found to be supportive of student-centred and personalised learning because portability, mobility, and flexibility are required for a constructive, student-centred approach.

With the use of mobile technology, collaborative learning, exploratory learning, and game-based learning, which are considered innovative educational methods, can be promoted in the classroom (Sung et al., 2016). These methods not only help develop subject content learning, they can also facilitate the development of communication skills, creativity, problem-solving skills, and higher-order thinking (ibid.). However, the use of mobile devices does not necessarily promote constructive thinking or reflection, and the pedagogical understanding needs to be improved to support higher-level skills such as analysis and evaluation.

2.3.2 The politics of technology: a critique

Technology causes many disruptions in society, for instance by creating new jobs and making others obsolete. Advancements in automation and data collection have led to the rise of machines, which have begun to execute more complicated tasks, and will result in an army of unemployed people (Facer, 2012; Peters et al., 2019). There is a concern that teachers will be one of the groups replaced by robots (Hughes, 2018; Selwyn, 2016). Another issue with technology is, surveillance which is an intrinsic component of technology, and is accepted as a necessity that contributes greater security (Andrejevic, 2019; Bauman & Donskis, 2013). Through socialising via the internet, people leave online footprints and share confidential personal information on social media platforms, which gather a huge volume of data (Yu & Couldry, 2020; Dijck, 2013). Existence now almost requires an online presence, and with the enormous volume of hyper-visible images, people want to see and be seen (Couldry & Hepp, 2016; Han, 2017a). When education meets technology, it creates a new culture of education, which will face challenges related to the concepts of datafication, ‘learnification’, and trans-humanism, which must be addressed to gain a more in-depth understanding of the impacts of technology on society. These issues will be addressed in turn in the following subsections.

Datafication

In the technology era, transparency and the provision of personal data are the prices that must be paid to be able to use the internet and be connected; people get used to this idea and internalise the process and its requirements (Bell, 2006). Personalisation of education requires that personal data be input to software to enable it to know and understand the user and provide more accurate predictions or solutions. It is also the case for the education of pupils with SEND and there are applications offer education based on data collection. Through discourse around the effectiveness of personalisation and belief in its value, users internalise the idea that their life should be transparent. Every movement of their body and every aspect of their life can be recorded. Data is an essential asset of the neoliberal education system that is obsessed with comparison and competition (Bradbury & Roberts-Holmes, 2017). Zuboff (2019) has argued that there is a relationship between behaviourism and the attention- and motivation-based technological structure of education. Technology and educational applications are designed around behaviour manipulation, behavioural analytics, and user engagement; a constructivist understanding is merely an 'add-on' intended to create a more user-friendly appearance (ibid.). Therefore, when it comes to behavioural issues, the behavioural implications of technology for practice become more of concern to design technologised educational activities.

Data tracking provides granular details about pupils and their progress, information which informs learning design and leads to personalised, specific, pedagogical action (Dijck and Poell, 2018). This phenomenon is called datafication, which some see as optimisation of personalised education, and others see as surveillance (Manolev et al., 2019). Data is also a property of technology, as it is a by-product of technology and many features are dependent on data (Peters, 2020; Hammond, 2010). Even effectiveness in analysing social trends is subject to datafication, as more data is purported to provide more in-depth insight into social phenomena. The below subsection will explain how this puts learning and learner at the centre of

education, which leads to the favouring of technology over teachers, the result of which is that learning requires optimised data tracking and learning opportunities (Dijck & Poell, 2018).

Learnification

Technology has transformed the horizon of education and institutions, as it introduced the concepts of deinstitutionalised education and lifelong learning (Biesta, 2015). Online learning platforms free education from its structural limits and spirit and turn it into flexible and accessible education that can be enjoyed at leisure (Houlden & Veletsianos, 2019). With technology, people have the opportunity to access educational materials and start learning without an institution and limitations in time and space. The 'learner knows best' discourse claims that learners should decide where, what, and how to learn (Kirschner & Merriënboer, 2013), and online platforms provide learning materials alongside entertainment materials. The boundary and distinction between leisure time and learning time are blurring, which is making everything part of the learning process. Offering technological content and entertainment content can lead to difficulties in staying on task for pupils with challenging behaviours while unrelated things are on offer in the same page (Kirschner & De Bruyckere, 2017).

Educational materials which are free of borders and structures have made education about learning. It also led to the segmentation of education into teaching and learning, as learning specifically became the business of education (Bayne, 2015a). This is related to the capitalist free-market understanding of education because, as Bayne (2015a, p. 458) states, it 'positions the student as a consumer of learning "services" provided by institutions and "learning providers", tying education itself into a marketised discourse emphasising demand, supply, efficiency, effectiveness and consumer need'. Over-emphasising the 'learner' and 'learning' reduced the role of teacher to merely a facilitator or, as suggested previously, a midwife, and in some cases led to removing the teacher from the equation entirely (Biesta, 2015). This 'language of learning' is rooted in the 'technocratic dream' that automation will

reasonably be achieved, and teachers will be replaced in the name of effectiveness (ibid.). This ideology is based on a rationalisation of learning where the target is merely effectiveness; the 'teaching machine' dream is about to come true, as technology has the ability to personalise teaching with state-of-the-art devices, but teachers are not coping with this transformation (Derry, 2009).

The delocalising of education refers to atomised and personalised learning environments, which put distance between a student and the public (Facer, 2011). Personalisation, which leads atomisation, can be an obstacle to building real-life relationships and connections. According to Facer (2011), the digitally structured world in which we live has three key attributes: discernment, which is the ability to judge the trustworthiness, reliability, and validity of information, as well as relate that information with other available information in hand, and the context and value of the information for the perceiver, community and society; multi-literacy, which is learning how to model, experiment with, visualise, verbalise, write, and film knowledge; and responsibility, which refers to the ethics of digital culture and life. The ease of manipulation in the digital world increases the importance of user responsibility to act in an ethical way. She suggested that these would potentially increase equality and justice in the society where people engage with a public that consists of people of different ages, ideologies, religions and needs as it is the case for this study.

Trans-humanism

In the 21st century, the socio-technical ideology and discourse of technology refers to the augmentation of personal skills through the combination of technology and drugs, which has resulted in the use of cognitive enhancement drugs such as Ritalin and Provigil (Han, 2017b). Techno-capitalist discourse imposes its understanding of the future, arguing that it will be impossible to resist any technological and drug-induced 'upgrades' to the body (Facer, 2012). This discourse predicts a future where, 'in the next few decades education will be personalised to harmonise with each student's traits, for example, personality, learning style, and states, such as affect and level of engagement. Computational tools will understand an individual's

strengths, weaknesses, challenges and motivational style, as might a human tutor. Technologies available to produce such personalised instruction include user-models, intelligent environments, gaming environments, and data mining' (Woolf, 2010, p. 6). As a result of this capability, technological development poses a threat to teachers, via automation and computerisation (Bayne, 2015a). In this context, datafication, learnification, trans-humanism, gamification, and edutainment are interrelated concepts that can help understand the pedagogy of ICT.

2.3.3 The pedagogy of ICT

Pedagogy refers to a set of activities that are consciously designed to enhance learning in another person. 'In an educational context, pedagogy often refers to the teaching strategies, techniques, or approaches that teachers use to deliver instruction or facilitate learning' (Wang, 2008, p. 412). An effective pedagogical design is the product of congruence between learning environment, content, teaching strategies, assessment and feedback, as well as underlying theories and values (Loveless, 2011). Technology and its value have become dimensions of pedagogy, in the context of which technology becomes more about why and what to teach than about how to teach. Loveless (2011) argued that 'ICT can be viewed as tools that shape these three dimensions to our practice as educators: in the curriculum that we teach; in the local strategies that we employ; and in the wider physical, social and cultural contexts in which we teach' (p. 311). Technology-driven pedagogy, however, can cause unpredictable consequences because it gives control to the learner and allows flexibility in time and space.

In the industrial age, education was classroom-bound, curriculum-directed, and fact-based; in this context, the teacher was a source and constructor of knowledge (Sørensen et al., 2007). In the so-called knowledge age, however, there was a paradigm shift in the understanding of education as open, flexible, student-centred, and problem-based (Biesta, 2012). Learning is not classroom-bound, but involves dynamic multimedia interactions via computers that makes the teacher a co-learner and facilitator who guides learning and consults with the learner (Koh et al., 2017). In

this new type of classroom, pupils and teachers are connected, and learning transcends the traditional time and space of school. ICT has thus been seen as the driving the change from subject-based and teacher-centred approaches to a more open, flexible, and learner-based educational understanding. This is expected to empower schools to transcend their previous obstacles and boundaries, and the change in pedagogy after the introduction of digital technology is unavoidable (Bayne, 2015b).

Each technological medium has a specific way of introducing and presenting the content; for example, IWBs allow smooth and speedy presentation using multimodal representation. According to Gillen et al. (2017), IWBs also promote a dialogic pedagogy, which makes teaching and learning more interactive. Although IWBs can transform education based on a dialogic or interactive pedagogy, and allow content to be manipulated spontaneously, they can also obstruct dialogic pedagogy, as teachers can use the affordances of IWBs to support their existing, traditional, uses of IWB. Using IWBs simply for projecting content instead of implementing interactive teaching approaches has no real advantages over traditional approaches (Kim et al., 2013).

ICT is an intrinsic component of the everyday classroom, as an information and learning tool. Therefore, its role can be related either to learning with ICT or learning about ICT itself (Vanderlinde et al., 2014). As such, it occupies a significant position in the classroom: it is needed for learning '21st century skills', information and communication technology skills, self-regulated learning strategies (ICT-based activities typically promote self-regulated learning, and learning with ICT), interactive education, and involvement with the outside world. In the everyday classroom, there is a distinction between 'the use of ICT for subject-matter content', 'the use of ICT for collaboration', and 'the use of ICT for higher order skills' (ibid., p. 2).

There are two main perspectives on children's use of technology; one is criticised as an overly protective view that sees the internet as a realm full of risk, and the contrary view sees the internet as empowering and creating opportunities for

children to reach self-actualisation (Craft, 2012). By creating content and engaging with others, children can self-manage their educational practices effectively, making it an emancipatory activity for citizens and agents of the new era. Children create and consume content on the internet, and in this way are emancipated and gain agency. According to Craft (2012), an empowering act in the modern world is to increase young people's use of digital devices while providing guidance on creative and critical skills. This empowerment is linked to giving control of internet access and usage to the user so that they can regulate their use freely based on their needs (Fawns, 2019). However, on the negative side, the age of social media and the production of content also involves risks for bullying, overusing and harassment.

TPACK

There are numerous instructional design models to help teachers integrate ICT into their pedagogy and curriculum, such as the ASSURE, ICARE, and TPACK models. The ASSURE model recommends that teachers, 'Analyse learners; State objectives; Select media and materials; Utilise media and materials; Require learner participation; Evaluate and revise' (Wang, 2008, p. 411). The ICARE model includes the steps 'Introduce; Connect; Apply; Reflect; Extend' for effective integration (ibid.). Finally, the TPACK model focuses on teacher's technological, pedagogical, and content knowledge, and is based on the assumption that the interaction between these knowledge domains will result in effective integration of ICT (Koehler & Mishra, 2009). There is some overlapping ideas to integrate in classroom for these three different strategies, but TPACK focuses on three important aspects of the education system. It focuses on combining these three areas of knowledge for effective teaching strategies, and these areas of knowledge can be specified when designing educational practices for pupils with SEND.

Moreover, TPACK framework is aligned with the affordances theory assumption that technology has its own biases and opportunities, making some technologies more appropriate and applicable in some situations than others (Archambault & Barnett, 2010; Henriksen et al., 2016). As such, Koehler and Mishra (2005) argue that 'good

teaching is not simply adding technology to the existing teaching and content domain. Rather, the introduction of technology causes the representation of new concepts and requires developing a sensitivity to the dynamic, transactional relationship between all three components suggested by the TPACK framework' (p. 134). An education system includes vital components including pedagogy, technology, and social interaction in and outside of the classroom (Wang, 2008; Swallow & Olofson, 2017).

According to Graham (2011), an educational theory can help understand the role of each component in the education system through a comprehensive evaluation and structuring of education. The theory should focus on education as a system to avoid seeing it as less than the sum of its parts, as a social institution works as several parts functioning in harmony. Rapid technological changes, the weakness of methodological design, and prioritising practical matters over theoretical underpinnings can lead to a lack of theorising educational practices. A vague and complex theory will have a negative impact on understanding. The underlying assumptions and rationale for theorising need to be considered so that the new theory can add value to existing practices. For improving educational praxis, methodological rigour and theoretical understanding is crucial.

For example, TPACK model is criticised on the grounds that technological imperatives hold such a strong position that sound pedagogical reason is generally ignored. The model, however, focuses on the connection between different domains of knowledge, such as content and technology, within the broader context of pedagogy, specifically constructivist pedagogy. The relationship between each of the domains and how they transform practice when they are combined is related to the understanding of theory development. That is, the relationship between the parts and the whole, but all parts need to be equally considered, for example the special needs of pupils with SEND or behavioural issues. While the different dimensions are working together as parts of the whole, they also work separately to fulfil their function based on their own characteristics. Identifying the nature of relationship is

essential and is related to the boundaries between the elements and the clarity of those boundaries.

Furthermore, the definition of technology needs to be clear to make applications of TPACK relevant to every educational context (Graham, 2011). Technology is widely understood to mean a state-of-the-art development. With the advent of each advancement in technology, old technology loses its position; this can happen slowly or quickly, but nowadays it tends to be quickly. The development of new tools makes old ones irrelevant and redundant. There are two types of advancement in relation to a technological tool or device: advancement in its use, or advancement in its features. The habits and usage of radio have not changed, as people still listen to the radio, but the tools used to listen have changed. The need and desire to listen to music prevails, but portable, mechanical players such as Sony Walkman were placed with all-digital devices such as Apple iPods, and CDs were replaced with flash disks. However, even more recently, storage devices have become obsolete with the development of cloud technology and the internet, although this practice may not be the case for every segment of society due to inequality in opportunities for access to these technologies.

Moreover, according to Koh et al. (2017), 21st century learning is aimed at developing the cognitive competencies necessary in the digital modern era, by improving one's collaborative and digital skills. Teachers, however, are lagging behind in recognising and understanding this transformation, as they use technology for content transmission only, rather than teaching the cognitive abilities required for understanding computing so as to thrive in the digitalised world. The reason teachers fail to make effective use of ICT is their incompetence in regard to TPACK (Willermark, 2018). The successful integration of technology requires knowing effective pedagogical approaches, a supportive school environment, and a positive collaboration culture in educational settings. Pedagogical vision and understanding drive pedagogical shifts and innovation, but to make this link stronger, knowledge and infrastructural competency should be improved. The use of ICT to implement 21st century learning skills, based on the TPACK framework, requires using ICT with

a combination of real-life problem-solving skills, collaboration, constructivism, and a student-centred approach (Koh et al., 2017).

Filtering the content available on the internet frustrates teachers and pupils and decreases the likelihood of internet resources being used effectively (Male & Burden, 2014). Concern about security and appropriate content is gaining attention and will result in increased filtering of content to minimise risks. Savage and Barnett (2015) argue that digital literacy skills are essential for teachers; these skills include media and information literacy, ability to communicate and collaborate through digital devices, online safety, and ability to evaluate, criticise, and present online information. Competency in different modes of communication, known as modal affordances (visual, aural and textual), is also essential to the TPACK framework because it involves pedagogy, technology, and content.

Gamification and edutainment

Games have educational value as they allow learners to practise and experiment with a task until they reach the desired level of ability or achievement (Miller & Robertson, 2010). Games also have an impact on creativity, imagination, originality, and problem solving (Ott & Pozzi, 2012). In epistemic games, pupils learn to think about real-life problems by playing a game designed to teach innovative and creative thinking (Shaffer, 2008). According to Shaffer (2008), games are the future of education, and it is one of the ways of teaching pupils essential skills. Games help to make a student's understanding of concepts more profound and thus enhances their knowledge. Educational games must be pedagogically valuable; therefore, de Freitas and Oliver (2006) proposed a four-dimensional framework to evaluate the value of digital game simulations. The first dimension concerns the context of where play will take place in terms of technical, historical, political, and economic factors. All aspects of the context have an impact on this dimension, and it can be an enabling factor for learning or can provide significant obstacles preventing learning from taking place. The second dimension focuses on the features and attributes of the learner group, such as their ability, way of learning, and personality traits. The

third dimension concerns the mode of presentation and narration of the game or simulation, the level of interactivity of the game and the effects of the format on educational gains – in other words, what it affords for learning, and how. The fourth dimension involves pedagogical consideration to reflect on the methods, theories, frameworks, and model used to support learning – experiential learning, activity theory, constructivist learning, and flexible learning.

Games are used to motivate pupils to engage in educational activities; therefore, they are commonly used by teachers (Cardoso-Leite & Bavelier, 2014). Progressing in the game is itself a sign of learning and achievement; thus, teachers can use games as an assessment strategy whereby the progress that pupils make is considered learning. It is typically difficult for teachers to grade all pupils at once, but games make this easier by the progress they made in the game (Domínguez et al., 2013). However, Hanus and Fox (2015) suggest that teachers make the class itself a game, a phenomenon known as gamification, which uses game elements in a non-game context. In gamified educational activities, pupils tend to demonstrate greater motivation and interest in the activity, which increases their learning; however, it is difficult to transfer this motivation and interest to other activities. A study by de-Marcos et al. (2014) concluded that students in the control group performed better in their final exam compare to research group, although the research group outperformed the control group on four different assignments which measured their learning of the topic. The study showed that being motivated by intrinsic factors is more potent than being motivated by extrinsic and tangible factors, and the use of extrinsic motivators frequently decreases intrinsic motivation making pupils more dependent on external factors (Hanus & Fox, 2015). Pupils in this situation may reduce the value of learning and praise materialistic outcomes instead.

Gamification has been found to increase motivation, enjoyment, and engagement by creating social competition and incentivising behaviour through reward systems (Hanus & Fox, 2015). However, the effects of gamification on the learner and the concept of education need to be researched. In a study by Hanus and Fox (2015), the elements of gamification, such as earning badges, a leader board to track

progress, and competition mechanics were examined and found to have adverse effects on educational outcomes and intrinsic motivation. Certain game design elements have a positive impact on special psychological needs, such as competence need satisfaction and perceived task meaningfulness (Sailer et al., 2017). Giving incentives for tedious tasks might increase motivation and can make lessons/material more engaging; however, gamification can be a double-edged sword, because sustaining interest and motivation during a gamified task is difficult (Hanus & Fox, 2015). Their study includes undergraduate students, so it is essential to distinguish the effects of gamification on different age groups, because a system which is not motivating for teenagers, might be motivating for a primary and secondary school student.

Playfulness is seen as a desirable experience aimed at creating interaction (Deterding et al., 2011). Pleasure and frustration are elements of learning that can also be observed in play (Pelletier, 2009). In cyberspace, identity itself becomes a playful phenomenon defined by loose boundaries and not tied to social conventions. Games involve the relaxed leisure time facilitated by the internet that focuses on the possibilities of actions to play around with materials and the meanings associated with them. Technological devices that are playful rather than game-like reduce all activities to play because there are no strict boundaries on the internet. Looseness and leisure are associated with entertainment rather than learning but, as discussed previously, leisure time is also part of learning because, with technological devices, learning transcends school time, but leisure also penetrates learning. The application ClassDojo aims to increase playfulness and gamify education and, at the same time, collect data about pupils' interaction to improve their performance, and functions as a behavioural control for teachers and parents (Manolev et al., 2019).

The competition and reward mechanism are related to consumerism and the capitalist culture, which promotes the idea of continuously setting increasingly greater goals, with success associated with having the highest goals (Alter, 2017). Modern capitalist consumerist culture consciously uses psychology to hook people in. Like a gambler, a gamer does not want to win all the time, nor do they want to

lose all the time; thus, games are designed to keep the users playing for longer with the feeling of an ‘almost win’, which is which leads to the critique that games are addictive (ibid.). The tools of consumerism are, by design, irresistible, which makes users vulnerable against these tools. Competitiveness, goal setting, and feedback are also the features of digital devices that hook users in. When a game become irresistible, it can affect people’s lives, as their priorities change. In the learning context, gamified features can hook pupils into an activity; these features include: setting a goal; giving feedback and warnings in the games, such as sounds and colourful signs that indicate failure or achievement; progress through levels and an associated sense of achievement; and escalation of difficulty at each level to increase motivation and make users curious about the next level, thus encouraging them to keep them playing.

Gamification is a commonly applied strategy in the learning context, as motivating pupils is a significant challenge for educators, and pupils associate school with boring activities (Alter, 2017). Rosen (2010) claimed that children dislike school because they don’t find it entertaining. Thus, the idea of making schools a place where students want to spend time, and education an enjoyable activity, has gained ground among educators, who argue that this will help to engage pupils in activities, increase their motivation for learning, and hence result in better achievement levels. It has been argued that the best way to make education fun is to make the learning experience like a game, with the curriculum and pedagogy structured using a step-by-step design that includes fun elements (Alter, 2017). Enjoyments increases engagement and as a result reduce boredom and disengagement; therefore, game elements and enjoyment are essential for educational activities (ibid). However, there is a risk of turning education into an entertainment business focused solely on entertaining pupils.

The pedagogy of ICT is a mixture of constructivist and behaviourist approaches that integrate engaging aspects of technological devices and behaviourist theories that offer strategies for how pupils react to stimulus. These behavioural aspects become more significant when educating pupils with challenging behaviours because they

have difficulties in motivation, attention and engagement. Although TPACK builds the pedagogy around constructivist and personalised approach, it still relies on a teacher to create a pedagogical understanding around integration of technological, pedagogical and curricular aspects. As it is discussed through the literature review, there is behaviourist understanding inherent to technology, therefore integrating ICT into the framework means integrating behaviourist features of technology. It may be utilised more effectively for pupils with behavioural problems, but behaviourist undersetting might have a negative impact on the ability to self-regulate as pupils with challenging behaviours like autism, ADHD and EBD have difficulties in self-regulating their behaviours (Otero et al., 2014). Teachers need to consider how to improve pupils cognitive, self-regulating, skills rather than behaviourist approaches while integrating ICT into teaching for supporting pupils' behaviours.

2.3.4 Teachers and ICT

The value that teachers assign to ICT is related to their competency in using ICT and, consequently, how they will use it in the classroom (Tondeur et al., 2008). The devices that require teachers to leave their comfort zone by analysing the pedagogy of the new device are more likely to be rejected (Underwood & Dillon, 2011). Teachers prefer to enhance their practice instead of transforming it, which leads to slow acceptance and adoption of innovative practices. Teachers' attitudes towards and beliefs about ICT have an impact on their use of it, which in turn impacts how innovative they are – their willingness to bring a change into the classroom, their practice, and pedagogical understanding (Tondeur et al., 2008). Although young teachers are more willing to use ICT in different ways, as they adopt technological devices into their life quickly, all teachers accept IWBs and mobile devices as must-have tools for education (Bruce & Chiu, 2015; Instefjord & Munthe, 2017).

Teachers are sceptical about pupils' ability to discriminate between websites offering reliable information and unreliable sources of information that impacts the way they use technology for teaching (Tondeur et al., 2017). There is a link here between classroom culture and the way teachers employ ICT for learning; in the traditional

classroom, teachers aim to control learning outcomes, moderate behaviours, maintain authority, and teach the curriculum, which creates a centralised and teacher-centred culture. By contrast, a culture that accepts use of computers gives freedom to the learner to construct their learning and identify their needs (Madden et al., 2005). If teachers are sceptical about pupils with challenging behaviours' ability to self-regulate their learning, they will employ student-centred educational strategies less.

Teachers are enthusiastic about technology because its multimodal functionality can make lessons more appealing (Mama & Hennessy, 2013). Teachers want to make their lessons more interesting, diverse, fun, accessible, and, as a result, more motivating and enjoyable for their pupils (Mumtaz, 2000). Inhibitors for effective integration include lack of skills, knowledge, on-site support, time, sources, and financing. These inhibitors have an impact on effective teaching practices, supporting pupils' problem-solving skills, and the successful implementation of a student-centred approach (Mama & Hennessy, 2013). In terms of their perspective on these issues, there are three types of teachers: the technophile, the preservationist, and the cautious optimist (Mumtaz, 2000; Mazman Akar, 2019). The preservationist integrates ICT into their existing drill and practice activities; in this way, ICT is used to improve the practices they are already using. Cautious optimists use ICT to change their practices and approaches, but in a slow way. The technophiles, by contrast, are early adopters and use ICT to make teaching easier in the classroom, as well as increase and improve learning through new opportunities created by technology.

Barriers against effective implementation and integration of ICT include both external factors (infrastructure, school culture support) and internal factors (time, teacher skills, confidence, belief and knowledge, student factors, teaching approach) (Fu, 2013). Teachers who are confident in using ICT for their teaching are more likely to integrate ICT into their pedagogy and implement a student-centred approach (Howard, 2013). This is related to a lack of skills and knowledge to integrate ICT to employ a problem-solving and student-centred approach or in the case of inclusive

education there is lack of skills to help pupils with SEND. Moreover, there is an inconsistency between what these teachers say and their practice in the classroom (Mama & Hennessy, 2013). According to Howard (2013), resistance from teachers who are unwilling to change their practice and use new technologies may be related to uncertainty and risk perception, which can impact their ability to evaluate the changes that technology will bring into their classroom. According to Koehler and Mishra (2009), however, the social and school context is unsupportive of ICT integration, which leads to inadequate and inappropriate experience of using ICT. Furthermore, many institutions fail to provide appropriate training for the integration of ICT in pedagogy and the curriculum (Aldunate & Nussbaum, 2013).

The degree of success in effective ICT-based pedagogy and computer proficiency varies between generations, even among the same generation, and proficiency is related to successful integration (Aldunate & Nussbaum, 2013). The more complex the tool is to use, the fewer teachers apply it; specifically, the knowledge of how to use ICT in an effective way for teaching is significant to successful utilisation of computers and other related tools. However, adequate ICT competency and infrastructure do not necessarily lead to effective integration and practice (Kim et al., 2013). The higher number of innovators in a teaching community increases the likelihood of ICT adoption; however, it does not indicate whether it is adopted effectively (Aldunate & Nussbaum, 2013). The characteristics of the teachers determine what the role of ICT in their classroom will be (Kim et al., 2013).

A study by Kim et al. (2013) demonstrated that there is a correlation between belief about the nature of knowledge and understanding of education. When teachers have a sophisticated epistemology, which supports the idea of the construction of knowledge; according to Kim et al. (2013), they tend to have a student-centred understanding of education. Beliefs about the nature of knowledge are related to the structure, source, stability, speed, and ability to acquire knowledge. Teachers' beliefs are a stronger influence than their knowledge in regard to the integration of ICT, because beliefs affect behaviours and decisions. Beliefs can concern the self-efficacy and educational value of technology for teaching and learning. However,

having beliefs about the educational value of technology does not necessarily mean that the practice of the holder of those beliefs will be successful. Therefore, teachers' understanding of the role of technology in their pedagogy and why teachers integrate, appropriate, and use ICT differently while having positive attitudes towards ICT in general needs to be analysed to improve educational practice. On the other hand, Palak and Walls (2009) observed that, although previous studies have argued for a link between the level of ICT integration and implementation of the student-centred approach, actual application of the student-centred approach is still rare in technology-rich schools.

In the integration of ICT, while the lack of resources is an issue; there is a more challenging issue which is how ICT will be integrated into a constructivist pedagogy to teach higher-order skills (Ertmer et al., 2012). Holding beliefs about the benefits of a student-centred approach does not necessarily mean that teachers will employ a constructivist student-centred approach. Ertmer et al. (2012) stated that teachers feel adequate about their knowledge and skills in relation to integrating ICT, and carry out internet searches regularly to improve their professional development. The participants in this research were award-winning technology-using teachers, who employed ICT as well as a student-centred approach successfully, based on an evaluation of schools' websites by the researchers. The barriers to integration for these teachers included support, money, time, access, state standards, and assessments. They indicated that social media platforms could improve their professional development and reported that they use technology to promote inquiry-based and project-based learning by solving real-life problems to transfer knowledge and construct their understanding of the world. Pedagogical, technological and curricular knowledge as well as positive attitudes toward and beliefs about student-centred approach, technology and inclusive education help making teaching more effective. Pupils with challenging behaviours will receive an education which is sensitive to their needs.

2.3.5 The concept of effective teaching

Effective teaching can be achieved when all aspects of education considered for meeting pupils' needs and integrated in an inclusive pedagogy. Even technology is employed to achieve effective teaching, helping pupils from different backgrounds to thrive in fast-changing world. According to Muijs and Reynolds (2017), effective teaching requires collaboration between pupils, teacher, pedagogy, classroom, subject knowledge, teaching methods, learning styles, and assessment. Theories of learning and intelligence have an impact on teachers' understanding of learners and the process of teaching. If teachers employ an interactive teaching strategy, they will use questioning and discussion to allow pupils to structure their learning while actively participating in educational activities as it is discussed earlier that their pedagogical understanding impacts their teaching strategies. Interaction between teachers and pupils is important for effective teaching, and involves frequent questioning, communication, and higher-order questions and statements, as well as directing pupils to reflect on their understanding of the topic. Questions prompt critical thinking, meaning making, and knowledge construction by creating interaction and communication, which is required for reflexive thinking. According to the constructivist approach, teachers create the conditions for learning by considering the multifaceted nature of the classroom, for example pupils with SEND. Engagement in educational activities, a positive relationship with pupils, adequate communication skills, and collaborative activities will lead to reflexive thinking and achievement.

Collaborative group work and peer tutoring can also increase the effectiveness of classroom teaching. Increasing interaction between classroom members will help to build a positive atmosphere for learning, in which pupils can learn from each other. Encouraging pupils to self-regulate their learning, personalising access, and having ownership of technology can help create teaching activities that will support collaboration and, as a result, increase effectiveness (Beauchamp, 2012). This is particularly important for pupils with challenging behaviours to self-regulate their

learning and behaviours and, learn from their peers. Pupils' metacognitive skills are essential to implement educational activities that are sensitive to their needs. Small group collaboration can increase the effectiveness of these activities; good preparation and careful structuring of groups is vital to their success. Effective group work requires sharing, participation, communication, listening, and clear goals.

As a significant aspect of the education system, the beliefs, values, and knowledge of teacher have an impact on the effectiveness of teaching. The teacher's attitudes towards their pupils, and their knowledge of the subject matter they are teaching, both affect pupils' achievement, and their approach to pupils SEND. The structure of the classroom and its management influence pupils' behaviour, and thus behaviour management is also key to success, specifically classroom that includes pupils with autism, ADHD and EBD. For positive behaviour management, teachers need to include pupils' voices and ensure they are aware of and understand the rules of the classroom. Teachers should also consider supporting students in their wellbeing, self-concept, resilience, and social skills development.

Homework is significant for educating pupils with and without SEND, and its effective use requires it to be integrated with everyday life, the curriculum, and classroom activities, and feedback to be given on the homework completed, as pupils need to feel that it is valued (Muijs & Reynolds, 2017). Feedback and additional support are significant for pupils with SEND so that they will follow up their learning. Pupils can feel overwhelmed by homework and feel their leisure time is being taken away from them, which can lead to negative attitudes towards school. The practice of completing homework requires time management, responsibility, self-efficacy, setting goals, managing distractions, and self-reflection which pupils with challenging behaviours have difficulties in, so their condition needs to be considered. Gaining these skills helps to increase achievement and self-regulation. There is also a positive relationship between academic attainment and the setting and completion of homework assignments.

Performance in education is also related to pupils' social skills (communication, manners, and relationships), wellbeing, self-concept, and self-esteem; thus, teachers should seek to support their psychological wellbeing. Appropriate teaching style is highly dependent on the skills of pupils, and each student will benefit differently from each teaching method (Loreman, 2017). Inclusion of pupils with SEND and the provision of additional support is a critical aspect of effective teaching practice, so teachers need to ensure that their practices are inclusive and differentiated. Learning of core subjects (literacy and mathematics) is important for success in other subjects. Assessing learning and using alternative and constructive assessment methods is another element of effective teaching. ICT provides multimodal assessment opportunities for being sensitive to different needs.

There are certain essential factors that maintain effective inclusive practices, for example the structure of lessons has an impact on outcomes, especially for pupils who depend on the resources that are available to them such as SEND (Robinson, 2017). Another factor is the class (group) size, which has an impact on the effectiveness of education of pupils with SEND to improve academic and social skills in the long-term. In addition, the attitude of teachers plays a crucial role in determining its effectiveness, so if teachers improve their teaching skills by using continuing professional development schemes that will inform them of the latest developments and improvements in the field of education. Teachers can also use peer-assessment methods to improve their practice, and continuous evaluation will support their professional development (Loreman, 2017). Professional development can increase the educational effectiveness by considering aspects of effective teaching, such as lack of teacher confidence, inadequate space and resources, and teaching strategies that focus too heavily on verbal and written analysis.

A significant aspect of effective teaching is classroom management that involves behaviour management. Classroom management can be effective when rules are discussed with pupils and Muijs and Reynolds (2017) recommended a few strategies. The LEAST model is one strategy to deal with misbehaviour, and consists of five steps to be followed by teachers: 1) leave it alone or ignore; 2) end the action

indirectly; 3) attend the behaviour more fully; 4) spell out directions; 5) track the behaviour (at the end of these steps, praise). In addition, the US Department of Education (2003 cited in Muijs and Reynolds, 2017, p. 188) provided recommendations for working with pupils with ADHD, as follows: 'work on the most difficult concept early in the day; give direction to one assignment at a time instead of directions to multiple task all at once; vary the type and pace of the activity to maximise pupils' attention; structure the pupils' environment to accommodate their special needs and the pupils can be seated away from distracting areas.' These behavioural management strategies consider the specific needs of pupils with behavioural problems to reduce misbehaviour and engage them in educational activities.

Inquiry-based learning is an effective teaching style that improves thinking and problem-solving skills. When inquiry relates to real-life problems and situations, it can lead to the acquisition of higher-order skills. Hattie (2008), however, argued that teacher-led approaches and direct instruction are more effective than inquiry-based approaches because educational activities can be controlled more effectively. Controlling pupils via inquiry-based, student-centred approaches can be a challenging activity for the teacher; therefore, they avoid using this activity, although it can improve construction of knowledge and metacognition. According to Muijs and Reynolds (2017), direct instruction, active learning, and whole-class teaching are more supportive than individualised learning because they include interaction and collaboration. Direct instruction, for example, is a supportive educational strategy that uses active teaching methods, considering the characteristics of the whole classroom to be able to include all pupils as the current study's focus is also on inclusion that will lead to achievement for pupils with challenging behaviours. Muijs and Reynolds (2017) describe the characteristics of the direct instruction teaching method as follows:

1. Clearly structured lessons

2. Clear, structured presentations (deductive and inductive model. Part-whole format, sequential ordering, combinatorial relationship and comparative relationship.)
3. Pacing
4. Modelling (e.g., video-modelling)
5. Use of conceptual mapping
6. Interactive questioning
7. Preparing individual work
8. Use of workbooks/textbooks
9. Organising individual work
10. Feedback on individual work
11. Differentiating individual work (taking into consideration different ability levels)

Moreover, the guidelines for direct instructions are: 1) directing, 2) instructing, 3) demonstrating, 4) explaining and illustrating, 5) questioning and discussing, 6) consolidating, 7) evaluating pupils' responses, 8) summarising (ibid.). This educational strategy relies on the effectiveness of individual work organisation which can lead to effective personalisation for pupils with different needs. Technology is an essential part of this strategy to apply to pupils with and without SEND.

Differentiation is important to achieve effectiveness because the process of differentiation accommodates the differences between learners so that all pupils will have the best possible chance of learning and achieving (Loreman, 2017). Different methods and teaching activities lead to positive outcomes and effective performance for different pupils. Differentiation refers to the use of different approaches to challenge all pupils. For effective differentiation, learners need to self-regulate their learning because differentiation requires a level of independent learning skills (Livingstone, 2012). Self-regulation involves cognition, metacognition, and motivation as well as regulation of cognition planning, monitoring, and evaluation. Metacognition is the ability to reflect on one's own learning, skills, strengths, and weaknesses, as well as problem-solving ability. This might require heuristic problem-solving

strategies, which include understanding and representing the problem; selecting or planning the solution; executing the plan; and evaluating the results (ibid.).

Effective teaching and effective technology use are related themes, whereby it is highly unlikely that a teacher will be effective without effective applications of technology, as discussed earlier (Apple, 2004; Ertmer & Ottenbreit-Leftwich, 2010). Frameworks such as TPACK highlight the importance of combining and integrating knowledge in different domains to improve the pedagogical practices. Technological skills are components of teaching skills and technology is used to enhance pedagogy in the classroom. Therefore, effective teaching supports the idea of empowering the learner by employing flexible and creative uses of ICT to motivate and engage pupils. The combination of constructivism and ICT can increase effectiveness, because the two concepts are compatible. Features of ICT such as speed, capacity, automation, communicability, replication, provisionality, interactivity, non-linearity, and multi-modality are needed for employing constructivist activities (Pritchard, 2007). As Pritchard (2007) argued, the characteristics of constructivism are multiple perspectives, pupil-directed goals, teachers as coaches, metacognition, learner control, real-world activities and contexts, knowledge construction, knowledge-sharing, reference to what pupils know already, problem-solving, explicit thinking about errors and misconceptions, exploration, peer-group learning, offering alternative viewpoints, scaffolding, assessment for learning, and primary sources of data.

Behaviourist aspects, on the other hand, are prevalent in the classroom by using technology as stimulus and technology is behaviourist by-design because gamification is inherent in application design as it is discussed earlier. Everyday reality of the classroom is that different needs and different tools create a new pedagogy that holds certain pedagogical values like personalised learning and exploring what is on the internet. Pupils have to improve their skills to learn on the internet, so this requires a self-regulation to direct their learning, but behaviourism is reducing pupils to passivity of responding to stimulus (Koh et al., 2017). Moreover, collaboration which is essential to education requires participants of group work to

regulate their behaviour for the maximum gain. Education is interconnected with all these aspects that their effective integration leads to effective teaching.

2.3.6 Collaborative learning

In the connected world, collaboration is associated with computer-based education because interaction – as it is discussed in the affordances of ICT – is the by-product of digital technology (Warwick et al., 2011). Kearsley and Shneiderman (1998) discussed that engagement theory aims to engage pupils meaningfully in learning activities through interaction with others. The meaningful collaboration that is achieved through user interaction can be employed more effectively with technology, which facilitates interaction that would not otherwise be possible. Engagement theory focuses on engaging students in creative and interactive activities through problem-solving, reasoning, and decision-making activities. Engaging in interactive activities can enhance collaborative group work. Although online interaction can promote positive relationships between pupils, facilitation of online collaboration is needed for critical thinking and knowledge construction (Wang, 2008). The pedagogical role of a facilitator is to provide information, initiate questions, make connections, give informative feedback, and summarise the activity. Teachers must encourage participation, ask questions to promote reflection, and build a positive relationship with pupils. Managerial roles are also significant, for instance leadership, in keeping discussion focused, and regular monitoring to invite missing members of the collaborative group and establishing the rules for collaboration. The technical role of a facilitator is to provide information needed for the use of collaborative tools and opportunities to explore the system as well as encourage original uses.

Pedagogical knowledge is essential to develop pupils' ability to work collaboratively; for instance, by giving control to the learner, they can collaborate through taking ownership of their learning by using ICT (Ertmer & Ottenbreit-Leftwich, 2010). Pupils who are successful in self-regulating their education are also successful in collaborative learning, which involves intrapersonal regulation and arrangement of social interaction (Jarvela et al., 2015). Collaboration relies on the ability of the

learner to interact and share responsibility for achieving a goal. Collaboration is a pedagogical principle that supports effective teaching; therefore, the affordances of ICT, teachers' digital literacy skills (TPACK and integration), and collaboration are all interrelated concepts, jointly required to implement effective educational activities (Savage & Barnett, 2015). In a study of McKnight et al. (2016), teachers have reported using a multimodal representation of the curriculum and technology-enhanced collaborative tasks with students (blogs, Google Docs, discussion boards).

Interaction is an essential component of collaboration, and can occur at different levels, from minimal interaction (lecturing), to full participation and deep interactivity, which might involve uptake questioning, collective reflection, and dialogue (Kennewell et a., 2008). Deep interactivity can enhance assessment, knowledge extension, meaning-making, reciprocity, attention to learning and thinking, and attention to social and emotional needs. Interactive teaching can begin with directing and telling; demonstrating; explaining and illustrating; questioning and discussing; exploring and investigating; consolidating and embedding; reflecting and evaluating; and summarising (Kennewell et al., 2008). The interactivity facilitated by the internet enables the learner to collaborate and engage with peers without limitations of time and space (Greenhow et al., 2009).

Learning in a dialogic space engages teachers and pupils via dialogue enabling them to see the task through each other's eyes. In dialogic learning, the role of the more knowledgeable other is important to enable pupils to use their potential and previous knowledge for learning (Mercer et al., 2010). This is related to Vygotsky's Zone of Proximal Development (ZPD) (ibid.). The child–adult interaction is central in this theory, but in the classroom, components like ICT and school's ethos impact the interaction of adults. Wegerif (2007) points out that a computer is infinitely patient because it allows children as much time as they want to discuss an issue before moving on to the next stage of the activity, which is not possible for a teacher to do; however, technology can limit interaction when it is not structured to promote it. This founds as an essential feature of ICT while education pupils with SEND. For effective dialogic learning, pupils need to improve their communication skills and

argumentation; these skills are particularly significant for pupils with behavioural problems. According to Mercer et al. (2010), the use of IWBs can facilitate dialogic learning and communication in group activities; however, there is no distinction between the use of conventional dialogic teaching and ICT-based activities. ICT by itself, therefore, does not add value to education. The role of the teacher in collaborative group work is to facilitate discussion and occasionally intervene to lead the discussion in the right direction. Compared to conventional tools of dialogic teaching, the use of technology (e.g., IWBs) makes things easier, though visualising.

Orchestration is another closely related concept to collaboration; it aims to guide and manage different activities with different resources to reach synergy in the classroom (Prieto et al., 2011). It involves designing teaching activities based on the construction of knowledge with a student-centred approach and understanding the diverse needs of learners by using a variety of approaches to enhance their learning. Prieto et al. (2011) listed the aspects of orchestration, such as designing and planning collaborative learning activities that increase the chance to include all students and their diverse areas of development. Managing and regulating the learning process and all elements of learning within the learning environment is essential. Designing the lesson in a flexible way to be able to adapt to new situations effectively could increase the impact of intervention. Evaluating the learning process and providing the feedback on learning of pupils is essential for improving the practice based on evidence. Practice, synergy/alignment, and the learning theory/model that is employed should be evaluated through the lens of orchestration to determine whether teaching practices are sufficiently effective. The ways in which ICT can be used in primary education classrooms can also be evaluated and framed through thorough research.

In collaborative work, the structure, skills, and dynamics of the group has an impact on the effectiveness of the practice. According to one of the participant teachers in a study by Warwick and Kershner (2008), IWB supports the learning of the pupils to understand the problem and task; gather and organise relevant information; construct and manage a plan or strategy; and reason and test a hypothesis. Pupils'

active participation in knowledge-building can be achieved by their showing sensitive and informed support for each other; their joint awareness of task expectations; their acceptance of collective responsibility for completing an activity with some independence of the teacher; their perception of the importance of a division of labour that recognises individual strengths; and the contribution of pupils' different skills to the collective thinking, talking, and learning process (Warwick & Kershner, 2008, p. 279).

Looking at another example of collaborative work, a study by Woo et al. (2011) demonstrated that pupils have a positive perception of Wikis; specifically, that they enjoy the interactive nature of Wikis, the ability to share and seek information online, and the writing opportunities. Evaluating each other's work and examining the relevance of the available online information were also found to be valuable. Furthermore, Wikis afford social and collaborative features such as peer-commenting, which encourages interaction among students. Learning in or with a group as a part of teamwork is a form of collaboration, which is facilitated through collective feedback and learning from and with others through the co-construction of writing. Woo et al. (2011) examined the creation of a Wiki, and found that it has the following features:

- 'Media; Readability, View-ability, Write-ability, Draw-ability
- Spatial; Resize-ability, Move-ability
- Temporal; Playback-ability, Accessibility, Record-ability, Synchronous-ability
- Navigational; Browse-ability, Search-ability, Data-manipulation-ability, Link-ability
- Emphasis; Highlight-ability
- Synthesis; Combine-ability, Integrate-ability
- Access control; Permission-ability, Share-ability.' (p. 49)

According to the authors, their study findings are in line with the theory of affordances, demonstrating that new ideas were shared on the Wiki platform, but these ideas were not original, being found on the internet. Nevertheless, skills in

elaborating, reorganising, and replacing ideas were demonstrated, which are useful writing skills. Students also found the use of Wikis entertaining. Pupils are engaged in creative problem-solving activities, peer critiquing, and interaction, which can result in the improvement of higher-order skills, so teachers need to organise activities that lead to interaction of pupils with different backgrounds such as pupils with and without SEND.

2.3.7 Summary: technology in the effective education of pupils with SEND

In the education of pupils with SEND, differentiation and personalisation are central themes to support their skills development. In particular, representation of knowledge in different ways needs to be considered for SEND pupils, as well as the use of multimedia to engage them in educational activities (Beauchamp, 2012). This is because different representations of knowledge, a diversity of modes and multimodality remove many barriers for pupils with SEND and increase their inclusion in education (Flewitt et al., 2014). These opportunities can be provided by technology, such as touch-sensitive iPads, which increase these students' access to literacy and communication because they can complete the activity and express their opinions and feelings by touching the screen rather than verbally. This does, however, reduce their opportunities to communicate verbally, which can delay language development. Furthermore, the small size of the iPad screen can be an obstacle for some students with SEND, as it requires fine motor skills. Technology creates certain opportunities for practice as it is discussed throughout this chapter, therefore, each tool has a pedagogical impact which needs to be appropriated in line with the needs of pupils with challenging behaviours. It should strength their executive function for self-regulation which gain more importance with personalised learning, but there are issues around behaviourist nature of technology (i.e. tools and applications)

Although teachers have reported that spending too much time with new media is an obstacle to SEND pupils' development, they acknowledge that pupils do enjoy using these devices which can provides motivation for learning (Flewitt et al., 2014). Multimedia can be used to tailor the structure and design of the lesson based on individual needs and supports the learning of pupils with behavioural problems (Allsopp et al., 2009). Anderson and Shattuck (2012) suggest that four design characteristics for ICT-based activities need to be involved for effective interventions for pupils with SEND: learning frameworks, affordances of learning tools, contextual limitations, and domain knowledge presentation as it is discussed throughout this chapter that they are interconnected in education as a system which is bigger than the sum of its parts.

Another essential supporting aspect for pupils with SEND (i.e. challenging behaviours) is the teaching assistant (TA) who helps teachers to individualise learning, take care of personal needs and follow up the developments (Martin et al., 2019). Teaching assistants are widely used in the workforce and they have almost an essential role for the development of pupils with SEND. In recent times, TAs are expected to be aware of pedagogical needs of pupils and provide the educational activities which are sensitive to their needs (Bowles et al., 2018). They are involved in direct instruction of pupils with SEND and the whole class, so they are having an active role in the classroom and as an additional person in the classroom, they are very valuable to provide additional support (Wren, 2017). There should be integration of teacher and TA in regard to pedagogy as a general and as related to the use of ICT. TA is essential as the use of ICT in the classroom for pupils with SEND, therefore, in England when a child gets the diagnosis of SEND, the school provides a TA.

Technology integration that is guided by a research-based theoretical framework will increase the effectiveness of education and, as a result, integrate ICT in their practice (Courduff et al., 2016). In a study of Courduff et al. (2016), teachers preferred using technology that they are familiar with and have experience of; they also search for new applications and try to learn how to use them, although they

believe they are not tech-savvy. They are curious and keen to discover new ways of using technology, by discussing new apps and websites with colleagues. Technology is a tool as well as a toy that gets pupils' attention. Teachers generally consider technology to be a 'game-changer' in teaching pupils with disabilities, because of its multimodality. Some, however, believe it is equally possible to teach with chalk, which is simple for teachers to use and for pupils to understand. To dig deeper teachers' pedagogical understanding of technology, teachers were asked to reflect on the role of technology in their classroom and how they make sense of the impact of technology.

Learners' needs and learning objectives must be at the centre of the technology integration process, and specific needs, such as the motor skills required for using the device, need to be considered. One teacher reported that they try to make pupils' experiences as 'real' as possible, and often use videos to achieve this because they show real-life examples and representations. Visuals and graphic organisers are also frequently employed to enhance teaching. Simplicity and familiarity bring success, and teachers have reported that technology should be pupil-friendly; however, something being easy for teachers to use does not necessarily mean it will be easy for pupils to use (ibid.). Pupils must be able to manipulate technology so that they can use it more effectively to achieve autonomy (Aesaert & van Braak, 2014). The ownership of the technology is also essential, but one teacher stated that the boundaries of ownership and usage must be clear so that pupils do not veer off-task (ibid.). Also, scheduling and planning increase the effectiveness.

ICT has been found to be motivational in an education context; it has a positive impact on classroom behaviour because it allows pupils to improve the quality of their work in terms of writing, presentation, and appearance (Passey et al., 2004; Vrasidas, 2015). Pupils and teachers, therefore, associated these improvements with the use of ICT, which helps them to remain on-task and have positive attitudes towards learning that is significant for pupils with behavioural problems (Howard et al., 2016; Vrasidas, 2015). Pupils remain focused, engaged and less distracted while using ICT for their learning, which has a positive impact on behaviours (Vrasidas,

2015). They find lessons more interesting when they include multimodality, games, and content manipulation. As a result, they learn more and work more independently, according to teachers in the study of Howard et al. (2016). Visuals and animated content are supportive because they attract pupils' attention, and the ideal uses of ICT according to Passey et al. (2004) include writing, research, design, production, presentation, and evaluation. Teachers, however, generally use ICT for editing, presenting, and researching activities, not for more complicated ideas that will support analytical and critical thinking. Digital literacy is a significant dimension of the modern world, and children start engaging in the digital world at an early age, meaning they have already acquired some digital literacy skills (D'Agostino et al., 2016).

A study by Rosen et al. (2014) suggests that there is a positive correlation between attention problems and the use of digital devices. Research by Parkes et al. (2013) similarly suggested that there is a causal relationship between screen time and conduct problems, with three hours or more per day leading to an increase in conduct and attention problems, and other studies show that pupils with ADHD spend more time on screens and gaming (Andreassen et al., 2016). Ferguson (2015), also, argued that games have a minimal effect on pupils' emotional wellbeing. Therefore, this study focuses on behavioural implications of technology in and out of the classroom and teacher are invited to reflect on how pupils behave during ICT-based educational activities.

Teachers can experience difficulties in dealing with misbehaviour while using ICT-based teaching activities because lack of support and time (Kopcha, 2012). In a study by Kopcha (2012) teachers indicated that there is thus a need for mentoring to improve their practice, increase their confidence in using ICT, and promote positive attitudes towards ICT because when pupils receive mentoring their knowledge of ICT and its integration is improved. The role of an adult accompanying them while they are learning with ICT needs to be considered to improve the new pedagogy which is created with the use of ICT. Students, also, exhibit on-task behaviours during ICT-based activities, which supports their learning and facilitates problem solving and

critical thinking (Howard et al., 2016; Vrasidas, 2015). It was engaging and used to facilitate learning instead of lecturing; however, ICT-based activities require planning and preparation to meet the needs of students (Kopcha, 2012).

With constructivist theory, it is argued that learning should be personalised because every learner constructs their learning, therefore, with the advancement of technology, the discourse is around giving the whole control to the learner so that they will pursue their learning with personalised learning tools. This theory also includes the interaction between peers as learning is derived from social interaction and the Vygotskian significant other is an important aspect of personalised learning as well as collaboration in the classroom. Technology allows to create interactive learning programs that pupils with and without SEND interact with each other as well as with the software. Pupils can collaborate when they are in the classroom or at home because they have educational applications that are designed to create interactive learning regardless of the space and time. This study is designed to analyse the constructivist, personalised, collaborative and contextual pedagogy of technology and specifically how it is used to support pupils with challenging behaviours learning. The role of technology is analysed to build a theoretical and pedagogical understanding by focusing how teachers and SENCOs make sense of the role of ICT for teaching and learning.

The classroom is the meeting point for teachers, technology, students, and pedagogy, which requires a holistic, educational approach to inquiry. While reading the literature and discussing the use of ICT in the classroom with colleagues, some themes emerged. From the beginning, SEND was central to the study, so the relationship between students when completing ICT-based educational activities, the collaboration between them, and their reaction to ICT were identified as being significant to improving educational practice in the classroom. The behavioural implications of ICT, its impact on the teaching and learning of pupils with behavioural problems – specifically ADHD, EBD, and autism – became the foci of the consideration of pedagogy, effective practice, and academic and social skills development. However, instead of designing an intervention or focusing on the use

of specific applications, it is argued that education can be improved by exploring the current practice in terms of how teachers position ICT to perform their role, what effective teaching practices with ICT look like, and how to promote collaboration. This requires an investigation of the current situation and conditions of education in terms of students and their behaviours; teachers and their pedagogy; and technology and its affordances.

3. Methodology

In this chapter, the design of the study is discussed to analyse the process of data collection and analysis. Methodological standpoint is reflected on to give the philosophical implications of the chosen methods. This study explores the role of ICT in supporting the development of social and academic skills by pupils with behavioural problems in mainstream KS2 classrooms, and how it is being applied in daily practice to tackle educational issues while completing typical educational activities. More specifically, it looks at how ICT is being used to support collaboration between students with or without behavioural problems, and how teachers position ICT in terms of delivering effective teaching activities. ICT has been found to be essential for effective teaching of pupils with both SEND and non-SEND; thus, exploring the role of ICT in the classroom for supporting teaching and learning practices is related to how ICT is being effectively utilised by teachers and students to keep pace with a fast-changing world (McKnight et al., 2016; Sung et al., 2016; Watson, 2001). Moreover, with the introduction of ICT, the traditional teacher and student roles have been transformed so that teachers are facilitators and students are learners on the internet, which provides a vast amount of information (Orlando, 2013). There has been a pedagogical shift that has led to the personalisation of learning and the curriculum, which creates an understanding that students can be allowed to learn at their own pace and build knowledge based on their own experience and previous knowledge. ICT is considered to provide a basis for this personalisation and construction by increasing access on open internet networks (Underwood & Dillon, 2011).

A mixed-methods study design was used to find answers to the research questions. As the first step in the research, to obtain a general picture of ICT in the classroom, a survey design was applied; the data and themes that emerged from the questionnaire responses then informed the questions asked in the interviews, to gain a deeper understanding of the themes. Teachers' accounts of classroom practices are important to understand the teaching and learning experiences of the students

for the educational practice; therefore, survey and interview methods were used to obtain their perspective and help explore what is happening in the classroom.

3.1 Aims and research questions

This study aims to understand teachers' use of technology in their daily classroom activities and offer an in-depth and critical look at the role of technology within this context. It will explore the impact of ICT on the academic and social development of pupils with behavioural problems and how teachers are using ICT to create effective and supportive teaching practices and collaboration among KS2 pupils with SEND, including those with autism, ADHD, EBD, learning difficulties, and other special groups. Behavioural problems are more common among SEND pupils, an indication of not being fully engaged, either due to learning difficulties or as a result of their special condition in the case of autism, ADHD, and EBD. The classroom is a complex environment in many ways, and education is a complicated process that is the combination of many different aspects: pupils with SEND or not, teachers and their pedagogical understanding, and technology and its affordances. The classroom is a multifaceted environment where pupils with SEND interact with their peers, and ICT is used to support them, but the impact is reliant on the pedagogical understanding of teachers.

Engagement with the research community and literature has highlighted the need for a comprehensive analysis of ICT in the classroom and teachers' meaning-making with regard to ICT for educational activities. The research questions addressed in this study require an exploration of current educational practices and interpretation of ICT-based educational activities. First research question is 'what is the role of ICT in fostering the social and academic development of pupils with behavioural problems in mainstream Key Stage 2 classrooms?' and the methods that are likely to provide data are survey and interviewing because first a general picture of phenomenon will be provided and then it will dig deeper to look for patterns. Second question is 'how is ICT applied in these classrooms to improve collaborative working between pupils with behavioural problems and their typical peers?' and similar to previous one for a

comprehensive analysis survey and interview are required. Third question, ‘how do teachers think that ICT can support the improvement of their teaching practice?’, more likely to be analysed with qualitative data gathered through open question in survey and interview.

3.2 Philosophical underpinnings

3.2.1 Researching education

Researching education is a socio-political process which includes the standpoint of the researcher as well as the institutions that the research takes place within. The need for ongoing research underpins the political idea that schools are in need of improvement; thus, transforming schools is a necessity, and can be achieved by integrating more ICT (Somekh, 2007). Therefore, the research is underpinned by the innovative modern ideology that the future is brighter than the past, due to ongoing development. This ideology is what underpins the purpose of the research, and must be challenged and justified from a critical standpoint to make the socio-political standpoint of the researcher, and the researched institutions and stakeholders, more transparent. The chosen method for inquiry is related to the goal of the research, and the research aims dictate the nature of the inquiry. For example, if a researcher is seeking to understand a phenomenon by interpreting data, criticise the structure of society in terms of power, undertake an analysis through the lens of a theory, or to improve the effectiveness of practice, these goals will guide the researcher during the selection of methodology and data collection and analysis methods (Reeves, 2000).

A power dynamic exists within and behind all research, as Postman (1993, p. 63) explained in *Technopoly*: ‘This is why it is possible to say almost anything without contradiction provided you begin your utterance with the words "A study has shown…" or "Scientists now tell us that…"’. Scientists are the prophets of the modern times, showing people how to live and what to believe (Zuboff, 2019). This is why, in a Technopoly, where scientific methods of tool-making defines the logic of

social order, there can be no transcendent sense of purpose or meaning, no cultural coherence. Information is dangerous when it has no place to go, when there is no theory to which it applies, no pattern in which it fits when there is no higher purpose that it serves (Postman, 1993). Research must serve a purpose, and information needs a place to fit so that a researcher can criticise the structure of techno-capitalist social order.

The positivist researcher claims to be value-free, but value-free research is itself a new value that seek to remove all transcendent purposes, such as having a moral, value-based, standpoint (Postman, 1993). In the Technopoly and techno-capitalist society, when criticising the transformation of traditional roles and institutions, the critics are devalued by claiming this is an old moral panic that has been witnessed with printing machines, textile machines, television, computers, the internet, and automation. It is criticised as a moral panic on the grounds of a conservatist tendency to maintain the established order and dynamics of society and implies a resistance to change. People who subscribe to this idea react negatively to the idea of change because of their belief in the established structure.

Positivism, however, claims to be value-free and does not count on any moralistic standpoint. It yet intrinsically values rationalising all institutions so that they act on a scientific basis to make society run like a machine and reach the ultimate level of effectiveness (Ritzer, 2013). It is the politics of evidence, which prioritises what works most effectively and rationally, on the basis that evidence cannot be ignored (Denzin, 2010). It is therefore vital for a researcher to be critical about the process of the research and philosophical stance, which provides a socio-political lens for the research; this requires an ongoing critical engagement in what has been read and achieved through and by research.

Nevertheless, the loss or absence of value in social research, according to Bauman (2005), is not due to a trend towards positivist research but rather the current ‘liquid’ phase of modernity, so called because, in this new social order, all social forms ‘melt away’ quickly in such a way that they cannot serve as a theoretical frame of

reference for life. This creates uncertainty, which leads to the loss of a standpoint or sense of purpose with regard to social phenomena and research. In a world of fast-changing technology, it is almost impossible to keep pace with the fluidification and transformation of traditional institutions, the old social order. Things do not have a chance to age, before they become outdated and obsolete (ibid.). Thus, it is argued that education, which consists of an institution, pedagogy, and ethos, needs to be flexible to teach the so-called 21st century skills required to keep pace with a fast-changing world (Biesta, 2015).

Furthermore, in education, research itself can become quickly outdated, as the tools for teaching become obsolete with the advent of new tools that transform pedagogy. Research looks for meaning for society and individuals, but this meaning is not universal, it is local, and causes liquidification of meaning and uncertainty. Things that are liquid are not good at keeping their shape, but are good at being shaped (Bauman, 2005, 2013), therefore, education is criticised in terms of not being liquid enough, and not adopting changes that are forced upon the school from outside. The question of what schools stand for has thus been frequently asked in recent decades and will continue to be in coming years.

In ‘Liquid Modernity’ Bauman (2013) referenced Ulrich Beck’s concept of ‘second modernisation’, and argued that institutions such as family, neighbourhood, and class are ‘zombie institutions’ in the second modernity. In this context, school can be considered an institution that is ‘dead but still alive’. Schools are institutionally alive but do not function in accordance with their purpose of the design, thus, these institutions need to be transformed to be brought in line with the changing order. Soon, schools too will be considered a zombie institution, due to ongoing transformation. Schools are already being criticised for not having the capacity to keep pace with the changes that are bringing a new order to the classroom. In its traditional sense, the school institution is obsolete because it cannot continue to function as it did, but it is slow to adopt changes, which makes it a ‘zombie’ in the technologised world. In the old order, teachers and books were at the centre of education, but now students and tools are at the centre (Biesta, 2015). Therefore,

researching zombie educational institutions requires a rigorous contextualisation of the setting and a critical approach to the paradigmatic shift to theorise the practicality of zombie institutions and their everyday reality. Furthermore, Postman (1995) has argued that modern information technologies have led to the idea that schools have become entirely irrelevant, 'since there is now much more information available outside the classroom than inside.'

3.2.2 Positivism vs. Constructivism

The relationship between science and power (for instance, political and economic power) has made some schools of thought critical of science, considering the idea of value-free and unbiased research to be a delusion, and the researcher as someone who aims to be enlightened by inquiry (Robson & McCartan, 2016). This is the man of enlightenment, homo scientificus who claims to be value free, but the power dynamic behind research creates the needs of an ongoing critique of scientific endeavour. Thus, according to Robson and McCartan (2016) who recommend a combination of post-positivist which recognises the biases in the process but still aims to achieve objectivity and constructivist approaches to educational research. This scientific approach is problem-based, systematic, sceptical, and ethical real-world research. As such, two different research paradigms, qualitative and quantitative, ask questions, choose their setting and participants, and collect and analyse data differently. The two different paradigms will be analysed in the remainder of this chapter, which will also clarify the standpoint of the current research. Finally, the positivist and interpretive dichotomy will be evaluated based on their philosophical underpinnings.

In a discussion of mixed-methods research, modernism and postmodernism need to be discussed to evaluate the paradigmatic positions of these two different philosophical schools. Modernism represents an ideology which spread during 'the Enlightenment' era in Europe, which was rooted in the scientific revolution of the 16th century to counter the power of the Church, which, according to modernists, represented superstition, irrationality, and ignorance (Robson & McCartan, 2016).

Modernism is based on the positivist idea of a universal reality which can be observed through scientific experiments. It is accepted as a progressive ideology because, with the use of the scientific method, everyday reality has a rational basis. Reality is assumed to be observable and falsifiable, so it is value-free and independent of the researcher. On the other hand, postmodernism, which is based on a constructivist ideology, is in direct opposition to modernism and the positivist approach. Postmodernists criticise the idea of general truth and objectivity because 'objective criteria that are presented as a basis for distinguishing truth from falsity are seen to be nothing more than forms of persuasion that are designed to show that what is claimed is true' (Blaikie, 2007, p. 50). On the other hand, postmodernists are argued to have a parasitic bias because of their condemnation of the whole modernist tradition and are criticised for proposing nothing that can be used as a frame of reference, as they are proposing multiple interpretations instead of a unified and logical interpretations (ibid.).

However, according to Lyotard (cited in Bauman & Lyon, 2012), 'one cannot be modern without being first postmodern.' Therefore, there is a relationship between the two ideologies that amounts to more than the postmodernist simply rejecting whatever the modernist says. In terms of their roots, they share a similar standpoint towards the subject under study, whereby the researcher always holds the power and authority of defining what they study, and research itself produces a power relationship; therefore, regardless of reflection, a new power dynamic of superiority is produced through research. Modern or postmodern, neither perspective can tolerate irrationality, superstition, or ignorance although postmodernism leaves room for alternative readings and multiple voices (Blaikie, 2007). Both perspectives, however, have a distinct understanding of reality: for postmodernists, reality is context-specific and value-laden, and there are multiple and social realities; for modernists, there is a single, value-free, universal, and objective reality. Based on this belief, the postmodernist constructivist approach aims to be inclusive of indigenous, oppressed, colonised, and non-mainstream groups' realities; when these groups are studied, they are given the role of the researcher. In the postmodernist paradigm, these

groups are invited to the churches of modernism, universities where meaning is created for modern man, to carry out research themselves and create their own realities.

Emerging from the modernist versus post-modernist dualism, there are two paradigms available for the researcher to choose between when carrying out social research. One is the quantitative paradigm, which is based on the so-called natural, hard, sciences, such as physics, biology, and chemistry, to uncover the 'ultimate reality' discussed above (Robson & McCartan, 2016). On the other hand, the qualitative approach is based on the idea that being human means having different everyday realities and being subject to different circumstances and, therefore, research needs to consider differences such as language, culture, history, and geography. This approach finds less value in statistics, as they cannot help in understanding the complexity of social issues, whereas the quantitative approach focuses on large sample and objectivity of data generation and analysis. The next section will discuss the logic and rationale underlying the choice of methodology and methods applied in this study, based on a consideration of these two paradigms, to obtain a comprehensive understanding of the value of the current study and its contribution to research in this field.

Behavioural issues in pupils with ADHD, EBD, or autism need to be considered as a socially constructed phenomenon because behaviours are defined in their social context, as a part of relationships and situations. For example, in the home context, a behaviour might be considered problematic, and the child might be considered 'naughty', but when similar behaviour is displayed in the classroom, it can represent a behavioural issue that prevents all members of the class from learning. In addition, if the pupil is diagnosed with a SEND label, it will be considered that he or she has unmet needs, and the behaviour will be seen as a symptom of those unmet needs rather than a personality trait of the child. It is, therefore, crucial for the researcher to consider the participants' social understanding of the phenomenon and the context that is being studied. The behaviour cannot be evaluated separately from the context and their unique situation and it will help avoid stigmatisation of behaviours. In the

context of this study, the behavioural problems of particular interest are those that impact learning and make classroom management difficult for the teacher. As it is discussed below, mixed methods which combine two different paradigms integrate constructivist understanding to gain a deeper understanding of the phenomena.

3.3 Methodological approach

In an earlier study in a high school in Greece, the mixed-methods design was used to investigate the use of ICT in biology lessons to support pupils with ADHD in terms of increasing their concentration, improving their understanding of biology concepts, and their attitudes towards biology generally (Vassilopoulou & Mavrikaki, 2016). After designing a technology-based biology lesson for students with ADHD, the researchers observed the students in terms of how they learned and their interactions in the classroom; then, after the lesson, students were interviewed to collect qualitative data about the effectiveness of the session. In another prior study, a behavioural management strategy known as the Good Behaviour Game was used to promote positive behaviours via a gamified strategy, the results of which were analysed within a mixed-methods study design (Poduska & Kurki, 2014). Students were put into groups and awarded points based on their demonstration of desired behaviours, such as following classroom rules, and their relationship with their peers. The study included primary level classroom teachers, who were trained in the gamified strategy to be able to report on the outcome of the intervention. Surveys and interviews were employed to inquire about the teachers' perceptions towards the effectiveness of the gamified behavioural management strategy.

In research by Palak and Walls (2009), sequential mixed-methods study design was also used to collect and analyse quantitative (in the first phase) and qualitative (in the second phase) data to discover how teachers' educational beliefs impact their technological pedagogical approach. To gain in-depth insight into the impact of these beliefs, the researchers initially conducted a quantitative study to identify the factors that impact beliefs and, later, employed a qualitative approach to analyse these factors by interpreting the teacher participants' understanding of the role they played

in shaping their beliefs. In total, 113 teachers participated in the survey and, based on the survey findings, two extremely different pairs of cases were selected to participate in observation, interview, a lesson plan activity, and reflective accounts to answer specific questions related to their philosophical understanding of education. The qualitative phase of the research focused on capturing the experiences, values, beliefs, and opinions of teachers related to their meaning-making regarding the role of technology for their everyday teaching practices. Although the quantitative data did not demonstrate a link between teachers' beliefs and the use of collaborative and higher-order skills-based teaching and learning approaches, despite having sufficient infrastructure and skills to employ student-centred approach (e.g., project-based or collaborative learning), the mixed-methods approach meant the researchers were able to identify a link. The teachers reported that they integrated ICT into their existing teacher-centred practices and used technology for preparation and administration, indicating that, to enable effective integration of ICT, further structural changes were needed. Overall, their study demonstrated that mixed-methods can enable researchers to extend the scope that is possible when employing only one research paradigm (Johnson & Onwuegbuzie, 2004).

Mixed-methods research has also been used in the past to study a specific technology. For example, iPad applications are often used to teach academic skills, and in a mixed-methods study by D'Agostino et al. (2016) a reading recovery application was designed to improve the reading skills of struggling students from disadvantaged backgrounds. The participating students were split into a treatment group, which used the iPad application as part of the reading recovery programme, and a control group, which used magnetic letters, and their pre-test and post-test reading skills were measured. From each school, two teachers and struggling students from their class were randomly assigned, one to the treatment group, one to the control group. At the end of the study, teachers were interviewed about their beliefs and perceptions regarding the programme for improving reading skills. Teachers from both the control (five out of seven) and treatment (all seven) groups stated that they prefer to work with physical 3D magnetic letters. According to

D'Agostino et al. (2016), if teachers have a positive experience of using iPads for teaching and learning, they are more likely to have positive beliefs about the educational impact of ICT. The treatment group students performed better in terms of reading skills, and the researchers concluded that iPads are a motivational tool. This mixed-methods study demonstrated that the role of ICT could be studied effectively via this type of study design to determine how educational practices can be improved with existing and new teaching strategies.

The use of ICT to help develop 21st century learning skills based on the 'technological pedagogical content knowledge (TPACK)' framework involves using ICT with a combination of real-life problem-solving skills, collaboration, constructivism, and a student-centred approach (Koh et al., 2017). In a study by Koh et al. (2017), therefore, teachers participated in a professional development programme designed by the researchers based on their adaptation of the TPACK framework and their understanding of the aforementioned 21st century learning skills. Teachers' understanding of and confidence in using the framework and 21st century skills were investigated via a mixed-methods research design. Teachers are put into a design team and asked to design a lesson based on their educational understanding prior to the professional development programme, and then redesigned the lesson after it. Pre- and post-intervention surveys were conducted. They compared their initial lesson design with the redesigned lesson, and video recordings of the task were qualitatively analysed referring back to the TPACK-21CL rubric. The analysis of surveys, lesson observations, and teachers' reflections on the process demonstrated that teachers did make pedagogical changes, but the link between pedagogical visioning and pedagogical changes was not as strong as anticipated, as vision and belief were expected to drive practical changes. This study demonstrates that a mixed-methods study can effectively analyse teachers' theoretical understanding, its practical impact, and their reflection on the process of adopting an innovative and effective pedagogical shift towards so-called 21st century learning skills, which comprise real-life problem-solving skills, collaboration, constructivism, and personalised design of educational activities.

In another study, mixed-methods research was carried out to inquire about the impact of teachers' beliefs on the integration of ICT into teaching practices (Kim et al., 2013). The study demonstrated that there is a link between teachers' pedagogical understanding and their beliefs about the nature of knowledge, their understanding of effective teaching, and their integration of technology into their practice. While teachers' technological, pedagogical, and content knowledge is known to play a significant role in the integration of ICT, there remains a need to investigate why teachers with sufficient knowledge have different experiences. The current research project aims to analyse the role of ICT in KS2 classrooms considering all related aspects, such as inclusive classrooms, students with or without behavioural problems, effective teaching, collaboration among students, and teachers' pedagogical understanding.

The rationale for employing the mixed-methods research design in this study is to benefit from the strengths of two different research paradigms – qualitative and quantitative – and so create a third paradigm, as has been achieved successfully in previous studies in similar contexts and purposes. This third paradigm will not entirely compensate for the weaknesses of qualitative and quantitative methods, as both have disadvantages, but it can help to gain complementary data through the use of different methodological approaches and methods, in the case of this study, a survey and semi-structured interviews. The rationale behind the use of mixed methods is to take advantage of two main research paradigms and synthesising them to create a new research paradigm for inquiring a social phenomenon.

3.3.1 Mixed-methods study design

Quantitative and qualitative paradigms have been combined to investigate various phenomena in the field of education, including the role of ICT, as in the previously mentioned studies. It has been argued that combining two opposing paradigms, qualitative and quantitative, is not possible because they do not study the same phenomena (Robson & McCartan, 2016). Similar to a person who believes in a flat earth, and another who believes in a round earth, they are opposite paradigms and

fundamentally incompatible because they have no common standards for measurement Bryman (2006b). Their different understandings of reality and truth are what drives this incompatibility, as in the dichotomy of modernism and postmodernism. However, advocates of mixed-methods research design believe that instead of focusing on differences, the focus should be on the similarities, and that epistemology and methods should not be treated as synonymous (Onwuegbuzie & Leech, 2005). According to a study by Bryman (2006a), the benefits of a mixed-methods design include completeness, triangulation of data, offset, the inclusion of different research questions and contexts, the inclusion of both structures and processes, instrument development (one method guides the development of the other method), greater explanatory power, unexpected results, greater utility and credibility, a diversity of views, enhancement of data, sampling of different groups, and the possibility of confirming a hypothesis with one method and exploring it in more depth with the second method.

The philosophical underpinning of the mixed-methods design is pragmatism, which focuses on research aimed at bringing about practical improvements and gaining a direct benefit from the research. However, selecting the appropriate research design is not about choosing from a set of possible arrangements and sequences, but considering the conceptual framework of the phenomenon, the research questions, and the methods and validity of the research, to ensure rigour and quality (Robson & McCartan, 2016). The interaction between these five components leads to the design by ensuring all components are addressed, based on the nature of the phenomenon which is directly related to pragmatist understanding. There is ‘a tendency to stress the compatibility between quantitative and qualitative research and a pragmatic viewpoint, which prioritises using any approach that allows research questions to be answered regardless of its supposed philosophical presuppositions’ (Bryman, 2006b, p. 124). However, this can easily lead to an ‘anything goes’ understanding, which will lack a coherent rationale for conducting the research and thus the results will lack validity. This pragmatic tendency of mixed-methods researchers can lead to them prioritising methodological concerns over philosophical

and metaphysical ones (Robson & McCartan, 2016). However, research requires clarity of purpose, a frame of reference, and theory, which should be applied alongside establishing a methodological rationale. It would be naive to presume that simply combining different methods and aggregating the datasets obtained from these methods will lead to a complete picture of 'the reality' or 'the truth' and increased research validity (Denzin, 2010). Research, therefore, should begin with a theoretical model for selecting methods and research tools that complement the theoretical model.

Pragmatists believe that value, especially practical value, plays a significant role in research that primarily aims to have implications for practice. These practical implications that researchers are aiming to uncover are in their minds and lead their design, meaning they study what they think is essential for improving educational practice (Bryman, 2006b). However, many, if not all, social researchers conduct research with the primary motivation being an impact on or contribution to practice; at the very least, they believe that studying social trends will help to better understand social order and later instigate a change towards the desired direction. Pragmatism is a kind of anti-philosophy, over-emphasising the actuality, practice, and action (Johnson & Onwuegbuzie, 2004; Robson & McCartan, 2016). The main concern of the pragmatist is to identify the most appropriate research method for answering the research questions, so the philosophical standpoint is not of concern. However, research questions need to be considered alongside philosophical and theoretical standpoints and will add value to the research because methodology is not merely a technicality of doing research, it is a guiding philosophy (Hammersley, 2006).

Carrying out research without asking about what the nature of reality is and whether it can be known will cause the researcher to ignore assumptions, which need to be philosophically engaged with and paid attention to throughout all phases of the research (Hammersley, 2006). Throughout this section, the purpose and power of knowledge, the possibility of objectivity, and the universal ideal or hierarchy of truth have been considered to determine the philosophical stance of this research. Clarity

of purpose and transparency of process are required to increase the trustworthiness of the research, as personal choices of sampling and research steps can compromise the data (creating bias). Research that includes humans, however, cannot be purely objective as humans are not objects that will display the same reaction to stimuli every time (Bryman, 2016); thus there is no such thing as a scientific method, because researchers privilege their epistemic virtues and aims (Hammersley, 2006). Even the idea that there is a possibility of knowing an object, such as 'table', is challenged by philosophers, so a failure to discuss, from a philosophical perspective, the possibility of knowing something, will undermine the rigour and quality of research.

With the rise of big data and automation, the concept of the scientific method or ideal inquiry is receiving attention in the search for a perfect, practical, and productive societal design. Pragmatism, therefore, prioritises helping the designer of the new social form to reach this ideal, as its primary concern is the function and outcome of the research. Pragmatism is a 'neoclassical experimentalism' with mixed methods as pragmatism represents a dogmatic loyalty to quantitative methods (Denzin, 2010, p. 423). Evidence cannot be ignored, and, consequently, the new social order will function based on scientific evidence. In this research, therefore, interpretivism is central to understanding participants' interpretation of their life and include them in the process of making meaning out of their accounts of their social life, to avoid experimentalism. By asking teachers to interpret their experiences of ICT, the social dynamics of ICT and teaching will be better understood.

The quantitative - survey design

Survey questionnaire designs are used in social research to identify general patterns or a tendency in a specific group (Cohen et al., 2013). Numerical data can help to gain a broad picture of a correlation between two variables and, if used in longitudinal studies, can reveal how trends change over time. In line with the characteristics of quantitative studies, mentioned above, surveys tend to collect natural data, such as demographics, consumption patterns, and things that are

considered facts of social life. The data is presented through graphics and tables that can be analysed objectively by different researchers, but interpretation is needed to identify patterns and draw conclusions.

The concept of 'big numerical data' was at the centre of modernist social research, although postmodernism creates space for different narratives. However, there is a new trend in the age of 'big data', which praises the power of numerical data to reveal the reality of society. In an article published in *Wired* magazine in 2008, 'the end of theory' was declared, because the availability of 'inconceivably vast quantities of data have made theoretical models superfluous' (Han, 2017a, p. 78). Since then, 'big data' has become 'massive data', due to the recording of all behavioural traces on the internet. Thus, in identifying behavioural patterns, theoretical models have become obsolete. Statistical data has a tendency to make theory obsolete and to reveal reality via purely scientific methods, because 'numbers speak for themselves' (ibid., p. 78). In cases of lack of information, a theory is used as an auxiliary schema that compensates for the lack of explanation; thus, with enough data, the scientific method is able to eliminate the need for theory. Why people behave in a certain way is no longer of concern; causality is replaced by correlation, so 'why' is an obsolete question (ibid.).

In the age of big data, everything becomes a part of the realm of quantified phenomena. Not only every citizen has a number, but every phenomenon can also be quantified so that it can be studied by machines. This provides a close-up view of behavioural patterns that make details clearer and more visible, as if viewed under a microscope (Han, 2017a). It is not a question of whether sufficient data is available; it is a question of whether there is sufficient computational power and the 'intelligence' of algorithms to make meaning from the data. Everything on earth can be quantified by the scientific method, and survey design is aligned with its purpose, which is to help collect numerical data that can reveal behavioural patterns and relationships. Although in this study the sample of the survey is not big, big data is discussed to reflect on the tendency of quantitative approach which is understanding the world through numbers. With the scale of this study, it shows that it has a particularistic

tendency to study the phenomena that even though it includes quantitative data, it stills aims to go deep and analyse details.

Quantitative research is mainly concerned with fact-finding or testing hypotheses, rather than applying theoretical frameworks (Bryman, 2016). A survey, however, can be used to explore behavioural patterns and relationships by avoiding assumptions and theoretical models, to confirm whether a theory or a model can help to explain a situation (Cohen et al., 2013). The analysis methods that can be used in the survey design include correlations, regression, and factor analysis. On the other hand, a survey design can also be used to build a theory to explain a trend or phenomenon, but this is rare; it is generally used to test theories (Bryman, 2016). The survey can include structured, open-ended questions to generate qualitative information. At the end of the questionnaire used in the present study, open-ended questions were included, inviting participants to provide qualitative data for further analysis in subsequent semi-structured interviews.

Questionnaire

Questionnaires are a useful method for collecting personal and factual information such as participants' attitudes, preferences, and beliefs (Cohen et al., 2013). Questionnaires are utilised to generalise data within established parameters and provide numerical data on behaviours and experiences. The researcher can then examine relationships among variables, known as correlation and, based on these relationships, predictions are made. A conclusion can then be reached based on the correlations among variables, but it cannot indicate causality. In designing the questionnaire, the structure, type, and wording of questions is vital for eliciting an unbiased and accurate picture of the phenomenon being studied (Robson & McCartan, 2016). This has an impact on the reliability and validity of the data and is reliant on the proficiency of the researcher and the transparency of the process.

Questionnaires use a fixed design in a standardised format to collect data from a relatively large sample of people who represent the targeted group(s) (Robson & McCartan, 2016). The data they collect can provide a snapshot of the phenomenon

under study, which can be cross-sectional or longitudinal, by analysing changes over time or changing situations. A sample is selected to represent the targeted population so that the result can be generalised across the population, as it is almost impossible to survey the entire population. The level of generalisability and universality depends on whether the sample is sufficiently large to represent the population. This is a positivistic tendency of the survey design, which, 'by adopting an approach that is behavioural and anti-linguistic, relies on the stimulus-response model, and decontextualises the meaning of responses', enabling researchers 'to avoid rather than to confront directly the inter-related problems of context, discourse and meaning' (Mishler, 1991 in Robson and McCartan, 2016, p. 247). In this research, to avoid the positivistic tendency of the survey design, open-ended questions were included in the survey, and the instrument was combined with semi-structured interviews to consider the context and the meaning-making of the participants in the world. People are self-interpreting beings who continually re-interpret the world around them; therefore, a questionnaire should be contextualised by subsequent data collected through semi-structured interviews to build a more comprehensive understanding of the phenomenon.

In this research, a questionnaire was used to investigate the role of technology in KS2 classrooms for teaching and learning, and more specifically for supporting the academic and social development of pupils with behavioural problems. It also aimed to discover the perceptions of teachers about supporting pupils with SEND and the relationship between technology integration, collaboration, and effective teaching. The questionnaire was designed around the question of what kind of technological devices and educational websites are being used in the classroom and their importance in supporting teachers to perform their role and included Likert-scale questions (with seven options ranging from 'strongly disagree' to 'strongly agree'). At the end of the questionnaire, a number of open-ended questions were asked, to enable participants to provide more details about their understanding of special education and the use of technology for teaching learning. The reason for including open-ended questions, as mentioned earlier, was to collect qualitative data beyond

the scope of Likert-scale questions. Including a different type of questions can enrich the quality of data and its ability to reveal participants' perceptions and thinking. As it previously mentioned there are studies who use questionnaires to infer data about attitudes towards technology and inclusive education.

The qualitative phase - interpretative phenomenological analysis

Qualitative research is primarily concerned with meaning-making; in other words, making sense of the world, phenomena, and experiences by including individuals as meaning-makers of their own lives (Biggerstaff & Thompson, 2008). Interpretative phenomenological analysis (IPA) shares this primary goal of investigating individuals as 'self-interpreting beings' (Taylor, 1985) who engage in the interpretation of their experiences and the world around them (Pietkiewicz & Smith, 2014). It is especially useful when a research study is concerned with the complexity, uniqueness, novelty, and process of a particular phenomenon (Brocki & Wearden, 2006). The main reason to choose IPA over general thematic analysis as (Cohen et al., 2013) represented is to include participants' meaning making of their practice rather than organising data around themes. Later, they published a paper about being reflexive while using thematic analysis so that researchers will pay enough attention to their position, and do not focus on the process of identifying emerging themes (Braun & Clarke, 2019). There are similarities between research methods, but the differences are among philosophical underpinnings. In this study, therefore, the choice of IPA is about going beyond the discourse by applying double hermeneutics as it will be discussed later. It will help to understand everyday reality of the classroom and how ICT shapes the pedagogy with its complexities which are analysed through this current study.

As a research method, IPA is a subjective, qualitative method, as no two researchers conducting the same type of research or working with the same data are likely to carry out with a similar process, or data analysis. Participants who have experienced similar events will interpret those events differently, and have a different experience from others present during the same event as people have unique experiences

because everyone reacts differently to the world. This is the case for both the participant and the researcher; thus qualitative IPA aims to protect the particularity and subjectivity of the research but reflect on the process to increase the quality and trustworthiness of the analysis (ibid.).

The fundamental philosophical basis of IPA lies in phenomenology, hermeneutics, and idiography, which shape its qualitative and unique nature. Its descriptive and exploratory qualities allow researchers to see phenomena as they are, as they look, and let the phenomena speak for themselves (Pietkiewicz & Smith, 2014). To gain insight into a specific phenomenon, the researcher focuses on what things represent it in the world and interpret how these things are interpreted by the people who experience them. Interpretation is concerned with people's understanding of their experiences, but IPA does not take their interpretation for granted. IPA tries to see things from the perceiver's point of view, but also deconstructs them to see the social, political, and economic standpoints.

The central philosophical basis of IPA, phenomenology, was developed by Husserl, and later by his student, Heidegger, and concerns how things appear to people in their experiences (Pietkiewicz & Smith, 2014). It is concerned with the 'being', the existence and experience of the phenomenon, in order to reveal the essence of it as it is represented in consciousness (Larkin & Thompson, 2011). Humans are embodied and involved in the world, the realm of the practice; hence. our perception is shaped by the world around us and our experience of it. Thus, the phenomenologist sees human behaviours as the product of interpreting the world around them (Bryman, 2016). In its implementation, therefore, phenomenology is interpretative, aiming to discover how things appear to the perceivers by analysing their consciousness of the event or experience. All people apply interpretation at some level, so it is difficult to escape interpretation, but it is possible to reflect upon what our role in producing these interpretations is. It also requires a commitment from the researcher to challenge their own interpretation so that they can reflect upon the impact of their interpretation during interviews. The researcher should seek to understand the mindset of participants and their language, which mediates and

translates their experience, because interpretation makes the message and account of the participants clearer (Pietkiewicz & Smith, 2014).

The hermeneutical foundation requires the researcher to translate the participants' account and apply it to theory, bringing it into the realm of other people's understanding, as Hermes did in Greek Mythology (Pietkiewicz & Smith, 2014). Hermeneutics provide a theoretical orientation through which to translate and deconstruct the meaning-making of participants and the understanding behind their account of the event or experience (Smith & Osborn, 2004). The analytical process of IPA is based on double hermeneutics; first, participants interpret the world around them and, second, the researcher interprets the participant's account of their meaning-making of their life. Research aims to understand the perspectives and meaning-making of the participants with regard to experiences, events, phenomena, people, or objects (J. A. Smith & Osborn, 2004). At the same time, the researcher aims to be critical of participants' interpretation, by asking what they aimed to achieve in their interpretation. Are there any hidden issues or problems that the person might not be aware of? Is the account of the participant meaningful for interpretation? Therefore, IPA creates an opportunity for the researcher to carry out rigorous, rich, comprehensive, and high-quality analysis (Pietkiewicz & Smith, 2014).

An idiographic study aims to explore the particularity of a phenomenon in detail and depth, to analyse how the meaning is negotiated and constructed by participants in everyday life (Larkin & Thompson, 2011). Reflective and detailed first-person data is collected to make sense of people's experiences and how they make meaning of these experiences in their life. Participants are invited to reflect on their experiences and the associated intersubjective meaning of these experiences, focusing on the particular rather than the general. Participants have an experiential understanding of the phenomenon, and the research aims to explore the participants' experiences or understanding rather than explain them. The exploratory nature of IPA overlaps with the nature of the present research, which aims to explore the meaning that is associated with ICT for effectively supporting teaching of pupils with and without behavioural problems.

Epistemological reflexivity is a crucial aspect of the interpretive research paradigm, aiming to clarify the impact of the research questions on the inquiry; the impact of the design, method of analysis, and process of conducting the research on the data; the analysis and its implication for practice; and the impact of the way the research problem is framed and defined on the understanding of the investigated phenomena (Willig, 2013).

According to Mayoh and Onwuegbuzie (2015), mixed-methods research can be used effectively in combination with post-positivist and phenomenological studies, which share much common ground. It is suggested that the phenomenon should be the focus for the researcher before beginning to ask phenomenological questions. The quantitative phase of a mixed-methods study is argued to be useful for identifying the most relevant human experience to later be explored using IPA. The quantitative phase can provide a social context for the research, to identify a relevant topic. In the current study, the themes that emerged from the survey phase were explored in greater depth using IPA of data collected through semi-structured interviews. The quantitative questionnaire was used to obtain a general picture of teachers' perceptions of ICT, and the qualitative phenomenological semi-structured interviews were conducted to obtain more detailed accounts of the lived experiences of ICT in the primary classroom (specifically KS2), and the learning of pupils with behavioural problems. The cohesion between the data and the holistic approach to analysis are the strengths of combining the two approaches.

For an in-depth analysis of the phenomenon of using ICT in the classroom to support pupils with and without behavioural problems, IPA creates an opportunity to observe how the phenomenon presents itself in the accounts of teachers. Teachers shape the experiences of students through their pedagogical understanding of education; they bring education into existence for students. IPA is concerned with the existence of objects (in this case, computers and tablets), and the representation of these objects (in this case, in teachers' practice, and in students through their teachers). These objects, teachers' experiences, their performance of teaching, and the students' performance of learning create meaning associated with these objects and

experiences. This needs to be deconstructed to understand the educational value of these objects for teachers and learners.

Semi-structured interviews

Interviewing is a significant component of social research, used to generate data on people's views of the phenomenon under study, and invite them to reflect on their assumptions and beliefs (Fontana & Frey, 2005). Interviews include humans and their experiences of everyday life; indeed, the modern world is an 'interview society', because people are frequently asked about their experiences (ibid., 698). The practice of conversation is central to the acquisition of knowledge about others, as it enables people to communicate details about how they experience the world and explain the reasons why they act, feel, and think in a certain way. Through conversation, interviewing involves the interchanging of views (Brinkmann, 2013), and is used to understand what lies behind people's actions and to ask about their behaviours, opinions, and feelings (Robson & McCartan, 2016). The data that yields from interviewing is qualitative, but can be semi-structured or unstructured. The epistemological standpoint of the qualitative interview is that knowledge on a topic can be gained through people's meaning-making of their own life, rather than through the pure observation of their reactions in structured, semi-structured, and daily environments. Conversation and communication are central to human life, which is dialogic in the sense that conversation mediate thinking for people (Brinkmann, 2013). It is a paradigm shift that no longer sees the participants as manipulable subjects of structured experiments, where their data is external to them and gathered via a hard positivist scientific method, such as observation (Cohen et al., 2013).

Interviews have been widely used to find out why consumers purchase a particular product, to later develop a marketing strategy based on consumers' feelings about and reactions to a product. It became a tool that could be used to get into the minds of people in a way that would enable companies to increase their profits; for example, focus group interviews are used to discover what kind of meanings or

feelings should be evoked through advertisements of products in order to increase sales (Brinkman, 2013). As discussed previously, there is a power dynamic in every methodological standpoint, as well as in the associated research instruments, which can be used for the commodification of behaviours and feelings. In this study, however, the use of interviews is aimed to improve the understanding of ICT in the classroom, how teachers use ICT for educational activities, and its impact on pupils' behaviour. The central aims of this research are improving educational activities and exploring the role of ICT for teaching, which are pursued by interviewing the stakeholders of education to analyse first-hand educational experiences. Teachers were asked about their classroom practice and negotiation of technological tools for effective teaching, collaboration, and supporting SEND pupils; as such, the current research is exploratory rather than explanatory. The responses are the product of the conversation and the relationship between interviewer and interviewee, so the interview is intersubjective (Cohen et al., 2013). The atmosphere, the skills of the interviewer, and the participants' willingness to talk all have an impact, thus, research findings are also subject to these factors (Brinkman, 2013).

In semi-structured interviews, teachers and SENCOs are invited to convey their life experiences; this case, their experiences of using technology for effective teaching, the role of ICT in supporting the academic and social development of pupils with behavioural problems, or collaborative activities with pupils with and without behavioural problems. Participants were asked to reflect on their understanding of the phenomena under investigation and interpret their lived experiences to provide in-depth, rich, detailed accounts upon which the researcher could build an understanding of the phenomena. IPA uses interviewing as a research instrument to obtain meaningful data from participants about their lived experience and everyday practice; in this case, of primary education and the application of ICT (Brinkman, 2013). If the interviewer asks questions in an appropriate manner, and if the respondent is willing to contribute, accurate data will be generated (Cohen et al., 2013). There is, however, the possibility of the contamination of data, for instance if

the participant wishes to give a socially desirable answer or lies; transparency and reflection on the process can increase the reliability of data.

3.4 The design

3.4.1 Designing the questionnaire

The questionnaire was designed based on insights from literature on the integration of ICT, supporting pupils with SEND, effective teaching, and collaboration. The critical engagement with literature was intended to inform an analysis of the current situation of education and understand the possible future directions, as changes are continuously being forced on education and schools from outside. A mind map of themes from the literature led to the development of the survey questions, which were considered to be in line with research questions.

An internet-based (Google Docs) questionnaire was designed that included general information questions about demographics, the school context, and available technology. The later sections of the questionnaire included questions about teachers' use of ICT, such as whether they used internet-based resources and what kinds of websites they used. Available technological devices were listed, and teachers were asked to rate their importance to their pedagogy. In the subsequent sections of the questionnaire, Likert-scale questions with seven possible responses (strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree) were created to enquire about the role of ICT for teaching and supporting pupils with SEND. The questions aimed to identify what, how, and why teachers use ICT for teaching and supporting pupils with SEND. The final part of the questionnaire consisted of open-ended questions related to inclusion, the school's ethos for SEND, the distinction between SEND and behavioural problems, and teachers' suggestions for how to use ICT to support pupils with behavioural problems. Different types of questions were included to generate rich data for analysis.

After the initial design of the questionnaire had been completed, UK-based teachers and fellow doctoral researchers at the UCL Institute of Education were invited to participate in the survey; more than 20 individuals were invited to complete the pilot questionnaire, and eight completed it. The purpose of the pilot was to check the clarity of the questions in terms of wording and purpose. The wording and meaning of questions were discussed with the research supervisor and three PhD colleagues to avoid sending out unrelated, biased, and/or meaningless questions. The data collected from these eight respondents were analysed and their comments on the questionnaire overall were reflected on for the next step, which was to finalise the questionnaire and invite participants to complete it. The pilot study demonstrated that meaningful data was generated in line with the purpose of the research and the research questions.

Piloting the questionnaire improved the quality of the initial set of questions following reflection on pilot participants' feedback. This created an opportunity to consider the possibility of different understandings of each word used. Due to a lack of dialogue surrounding the consumption of written texts, readers create their own meanings and understanding of words and texts. Therefore, piloting is an attempt to eliminate the possibility of participants misunderstanding the questions or terms, which could lead to them giving responses that would not serve the purpose of the study. Piloting motivated further to analyse teachers' perceptions of ICT in their daily teaching practices and the logic of applying ICT to support the academic and social skills development of pupils with behavioural problems – specifically ADHD, autism and EBP.

The piloting process revealed the need to consider the meaning and understanding of two concepts in terms of their practical definition – behavioural problems (BP), and information and communication technology (ICT) —not just for the actual questionnaire, but also for the interview phase. In the context of this study, BP refers to attention deficit hyperactivity disorder, autism spectrum disorder, emotional and behavioural problems, and other behavioural issues exhibited in the classroom. This classification conforms to the UK's SEND Code of Practice (2015), which contain

classifications of ‘behavioural, emotional, and social difficulties’ and ‘autism spectrum disorder’ in the educational context. The behavioural issues that are symptoms of other SEND groups are also considered as behavioural problems in the present study. It can be seen in SEND Code of Practice that pupils with SEND without a statement or a diagnosis are displaying behavioural problems that teachers find challenging in terms of these pupils’ engagement in educational activities. It is necessary to understand the everyday life of the inclusive classroom, to avoid misunderstandings and ensure the study relates to real-life practices, and one participant in the pilot suggested adding questions related to inclusion. Furthermore, teachers might not have a common understanding of ICT, although it means computer technology with an internet connection that helps to process, share, and transform knowledge and information.

The question ‘what is your primary training/degree in?’ with a short-answer box was modified by listing a number of relevant graduation programmes to ensure that respondents tick the right response for their initial university degree; an ‘other’ box was also provided. When a change was made, any related questions were also modified accordingly to ensure the survey remained consistent and coherent. One of the pilot participants highlighted the importance of using direct language, as exemplified in this item: ‘teaching and learning are not really reliant on ICT’. By using a scale of agreement and modifying the question to ‘teaching and learning are reliant on ICT’, consistency in the questionnaire was maintained. Another pilot participant highlighted a need to clarify what is meant by ‘effective teaching’. This was further investigated in the semi-structured interviews, and data from both the questionnaire and the interview responses will be cross-checked. Every teacher has their own understanding of effective teaching, and it is worthwhile exploring what teachers understand effectiveness and effective practices to mean.

There was an ongoing discussion and reflection process to be inclusive of teachers with different experience and school context. Therefore, additional questions were added on school differences, policy towards SEND and BP, as well as the experiences and strategies that are used to support the social and academic

development of pupils with BP. Several other issues were highlighted, such as that some young teachers find it difficult to compare their current practices with the experiences of previous generations. Computers are not a recent addition to classrooms, but there has been a pedagogical shift towards digitisation of education through interactive whiteboards as well as providing personal computers like laptops and tablets for each child in the classroom (Zheng et al., 2016). With the new teaching and learning practices, it is possibly difficult for a young teacher to imagine education and classrooms without technology. However, the aim was to invite teachers to reflect on the role of the teacher compare to when teachers themselves were in primary schools and the teaching and learning practices of that time compared to the current understanding of ICT in education. The question about reflecting on changing educational practices specifically relates to the differences between a classroom that is highly ICT-based and a classroom before the advent of mobile devices.

Sampling for the questionnaire

The questionnaire was digitally circulated among London-based KS2 teachers by finding contact information for schools on local council websites. Initially, the response rate was low, and approximately 20 teachers completed the questionnaire at the beginning of 2018. Therefore, in the first part of the 2018 spring term, thousands of schools around England and Wales were invited to send the questionnaire out to teachers via email. Although more than 30 schools agreed to forward the email to teachers, the response rate remained low, due to a lack of time; even among teachers who were invited in person to participate, and agreed, the response rate did not increase significantly. The second attempt to recruit participants was able to obtain 100 respondents, and the research progressed to the interviewing stage while continuing to look for more participants. During the interview design stage and the process of finding interview participants, the questionnaire reached 140 respondents after a third round of invitations was sent out. The questionnaire was then kept open. The participants were not only from London, there

were participants from all geographical regions of Britain. Some participants responded as UK; therefore, it is not clear where some participants are located. Therefore, statistical analysis between regions is not performed.

3.4.2 Designing the semi-structured interview

After collecting survey data from over 100 respondents, the data was analysed at the beginning of the second half of the 2018 spring term, and the first draft of interview questions was created. The themes and issues that emerged from the survey data were identified for further, more in-depth investigation. A map of the themes that emerged from the survey data was created to guide the creation of the interview questions, which were linked to the research questions to ensure they were relevant. The mapping helped to have a clear structure of interview questions and to create a link between the research questions, survey questions, and interview questions, thus improving the validity, quality, and rigour of the mixed-methods research. When all interview questions had been written, three teachers were interviewed as part of a pilot study to ensure the questions were appropriate and relevant. Piloting also enabled the researcher to practise and improve their interviewing skills, as this has an impact on the outcome of semi-structured interviews. Two secondary level teachers and one primary level teacher were interviewed for the pilot study; interviews lasted between 50 minutes and 1 hour and 15 minutes.

The type of questions asked in an interview has an impact on the data collected; open and reflective questions invite participants to focus on the meaning of things, and their reaction to and feelings about certain events and/or experiences. Therefore, the wording and structure of the questions were carefully considered to ensure they were in line with the purpose of the research and were relevant to the research questions. Before carrying out the pilot interviews, the questions were discussed with the research supervisor and PhD colleagues to avoid including any leading and/or problematic questions. There was an ongoing discussion about this, as questions were changed after every discussion, and eventually it was agreed to proceed with the interviews and that there is no such thing as ‘perfect’ interview

questions. Also, the nature of semi-structured interviewing demands some flexibility of conversation to make it natural and productive in terms of data. Therefore, interviewing skills play an essential role in influencing the quality of the research.

Each pilot interview was audio recorded and transcribed in order for the researcher to reflect on the process and the interaction with participants to improve for the next interview. Researchers should seek to ensure that the conversation remains on topic but, at the same time, flows as a natural conversation between two people. The discussion was fluent, but there was a need to ask additional related questions in addition to prompting; one of the advantages of semi-structured interviews is that unexpected information can be gained from the conversation. After the second interview, it was decided that the researcher could be more flexible when the opportunity to ask additional questions arose in the third pilot interview, and in the following interviews, which helped to generate valuable data. Three pilot participants were asked to provide feedback on the researcher's interviewing skills, the questions asked, and any additional aspects that should be included; in this way, they were part of the ongoing discussion. The pilot participants expressed that the conversation should feel natural but also purposeful, so the researcher should intervene when needed.

Another valuable outcome of piloting is data that provides an early picture of what might be achieved in the research. The pilot data is included in the analysis chapter to create a link between stages, as pilot participants were teachers and themes were relevant, as can be seen from the link between pilot study themes and actual themes. The pilot study themes were member-checked to increase the validity and trustworthiness of the research by making the process of tool-designing, piloting, sampling, and analysis more transparent. Moreover, the results of the pilot interviews were presented at the UCL Institute of Education Summer Conference 2018 and feedback was received from conference attendees. In the conference presentation, the link between survey themes and pilot interview themes was presented to clarify the foci for further investigation and was opened to discussion.

This study includes SENCOs as well as teachers, but the pilot study was carried out with only teachers. The SENCOs and teachers were asked different questions, but they were equivalent in terms of their focus on the experience of pupils with behavioural problems, how they are diagnosed, and how technology is and can be used to help them. The questions that were asked to teachers focused on pupils' learning and teaching as well as the collaboration between teachers to support pupils with SEND and inclusive education in their school. The experience of interviewing teachers can also be applied to interviewing SENCOs.

Sampling for interviewing

After the pilot data had been analysed and changes made to produce the final version of the interview questions, teachers from London were invited to participate in the research via their schools' administrations. The reason for choosing London-based teachers was to avoid the need to travel outside of London, but all participants were from schools in different parts of London. Hundreds of emails were sent to schools to invite them to participate in the study, but a limited number of responses were received, and only those who had the time and were willing to participate were interviewed. The participating teachers and SENCOs came from five different schools based in South and North London, and one school in West London. Interviews were held towards the end of the summer term of 2018 and the beginning of the autumn term of 2018.

Demographic information relating to the participants is presented in detail in the findings chapter. A voice recording device was used to record the interviews, and the sound quality for all interviews was high. The sound files were transferred to a university computer and a personal, encrypted computer for transcription. The interviews last between approximately 45 minutes and 1 hour 35 minutes, and yielded in-depth data. Interviews that are too long can be problematic as, after a certain point, participants might lose interest, which might impact the quality of their responses. In this study, two interviews with teachers exceeded 1 hour and 30 minutes; however, there was a break in each, and both participants were willing to

talk and demonstrated interest in the continuation of the interviews. In general, interviews lasted for approximately one hour.

3.5 Data analysis

This study used mixed methods study design, therefore quantitative and qualitative data was gathered. It was sequential mixed methods that first quantitative data gathered and then to gain a deeper understanding issues which were arising from questionnaire were investigated further. In the first step of data analysis, questionnaires were statistically analysed to identify a correlation between teachers' perception of using ICT and information about the current situation of technology in the classroom. The following step was to analyse open questions the survey to identify emerging themes and issues which need to be investigated further. Open questions provided qualitative data therefore interpretative phenomenological analysis applied (IPA) to analyse the survey's open questions. Later, interview data was analysed by using IPA and different analysis cross-referenced in the discussion chapter.

For the statistical analysis, SPSS is used. First of all, seven scales were coded as strongly disagree is coded as -3, disagree is coded as -2, somewhat disagree is coded as -1, neither agree nor disagree is coded as 0, somewhat agree is coded as 1, agree coded as 2 and strongly agree coded as 3. The correlation between dependent variables and independent variables is analysed by using one-way analysis of variance (ANOVA) is used. If there is a statistically significant difference between groups post-hoc test applied to see where the difference is. When there is no statistically significant difference, the responses of teachers and mean scores were analysed. The open-ended questions included at the end of the questionnaire were completed by almost half of the participants and provided valuable data for analysis even though some responses were concise. The data was coded, and emerging themes were identified. This data provided a basis for developing interview questions to gain a more in-depth understanding and to create a link between survey themes and interview themes. Graphics and tables were created for Likert-scale

questions and findings were later analysed by referring back to these tables and graphics. The qualitative analysis of the questionnaire's open questions data helped to keep the qualitative interviewing focused.

For qualitative analysis of interviews, first, verbatim transcriptions of interviews were created for later analysis of the text. Interviews were transcribed by the researcher on a desktop computer with a headset. In order to double-check the accuracy of the transcription and become familiar with the data, the transcripts were checked against the audio recordings. The transcripts were then stored on encrypted university computers and the researcher's PC. Pseudonymisation was applied by the participants themselves when they wanted to refer to any students. In this mixed methods study design, qualitative data were analysed by using IPA and to do this data analysis software NVivo was used for coding. Codes and emerging themes were identified to organise data in a meaningful way. The themes were in line with the research questions and survey themes. As it is discussed earlier IPA helps to interpret and make meaning participants account of their teaching experiences, based on the meaning-making and interpretation of participants. This is the double hermeneutics of everyday life, as people interpret the behaviours of others and self-reflect on their experiences. A detailed definition of IPA was provided in a previous section of this chapter.

The themes with only a few references in the transcripts were also included to make analysis more detailed as IPA is idiographic research that focuses on particularities. The particularities in the classroom are a part of everyday life, and thus they are included based on the relevance of the theories that are drawn on in this research. For validity, 40 codes were randomly selected from the themes and sent to three doctoral student peers alongside a five-point Likert scale (with responses ranging from agree to disagree) to undertake a member check. While writing the thesis, a poster was prepared to be presented at the Doctoral School's Summer Conference 2019 for further feedback and to demonstrate the link between the survey and interview themes. There was an ongoing process of discussion and reflection to improve the quality of the work.

The compatibility issue associated with mixed-methods research is reflected on in the discussion chapter, where the links between all data are discussed. Methodology chapter also discusses whether these different types of dataset provide a holistic approach to the phenomenon of everyday educational activities and pedagogical understanding for pupils with and without behavioural problems. IPA can be used as the primary component of a mixed-methods study (Mayoh & Onwuegbuzie, 2015). In the current study, IPA is the central data analysis method, so the survey data was used to provide a basis for the interviews, which aimed to investigate the role of ICT with rich, in-depth data. The uniqueness of the classroom was analysed within its particular context but also the similarities in use of ICT in the classroom and everyday practices, as the questionnaire was used to investigate commonalities and theorise the role of ICT in the education of pupils with and without behavioural problems.

3.6 Ethical considerations

Ethical research is not just a matter of ensuring the health and safety of participants. The transparency and trustworthiness of the research are also ethical issues. The research must be presented as it is, and the data should be protected from any contamination that would diminish the value of the research and so lead to wasted effort on the part of the researcher and the research institution. The issues of transparency, trustworthiness, and validity were addressed throughout the research. Ethical consideration is an ongoing process throughout the research and is an intrinsic value of rigorous and quality research. This research is based on inclusion, justice, and equality, which are also moral standpoints, and an overarching sense of purpose and meaning. As was mentioned earlier in this chapter, there is no such thing as value-free research; thus, there is a need for ongoing reflection on the position of the researcher to make it clear that the research is ethical and that there is a sense of responsibility, to the participants and to society. Therefore, a Participant Information Sheet was created and provided to participants, explaining what the

study expected to achieve, so they would know that by participating in the research they would be helping to improve educational practice (see Appendices).

This research includes only adult participants, who gave their informed consent to participate. The University College London Ethics Committee approved this research after determining that the Participant Information Sheet, Questionnaire Introduction, and Interview Consent Form complied with the British Educational Research Association (BERA, 2018) ethical guidelines for educational research. Participants were informed about how data would be stored, confidentially and on encrypted computers. They understood that they would not be misled for any reason during interviews, and that the conversation would be a natural conversation between two equal parties. There was no hierarchy in the room, as the IPA approach is to accept participants as experts on their practice, recognising that their interpretation of their life can provide valuable data that can help make meaning of the social phenomenon.

In line with the British Psychological Society's 'Ethics Guidelines for Internet Mediated Research' (BPA, 2017), The Questionnaire Introduction and Interview Consent Form informed the participants that the data they provided would be protected on encrypted computers and that they could withdraw from the research whenever they wanted, even after data collection was complete, and that their participation was entirely voluntary. They were informed that the results, in the form of anonymised quotations, would be presented in the form of a thesis report, academic publication, and conference paper in compliance with GDPR 2018. The anonymity of participants and their institutions was guaranteed to give the participants the confidence to speak freely; otherwise, they might have avoid expressing ideas that might create problems for them. The researcher's role was not to judge their practice, as the participants were contributing to a study which aims to improve educational practice. Therefore, during interviews, a friendly environment was created to enable participants to openly reflect on their practice and their meaning-making of experiences. Participants also have the right to be informed of the results and reporting of the research; the participants who provided contact

information and expressed a desire to read the published thesis or research articles will be contacted.

3.7 Conclusion

In this chapter, the data collection and analysis process has been discussed alongside the philosophical underpinnings, methodological approach, and research tools applied in the current study. The choice of mixed-methods design was discussed and justified, referencing the literature on similar research topics. The use of ICT in inclusive classrooms was investigated first with a questionnaire survey; then, the data generated from the questionnaires led to the design of semi-structured interviews. IPA was discussed as an appropriate method of analysis to make meaning of participants' understanding of technology with double hermeneutics and detailed analysis of their interpretation of their experiences in everyday life. It was clarified that there was reflection at all stages of the research process, to increase the trustworthiness and rigour of the study by being transparent about the researcher's role throughout all stages. The next chapter will present the data that was generated by the questionnaire and interviews. The findings related to the quantitative and qualitative data will then be presented to analyse the role of ICT in supporting the academic and social skills of pupils with and without behavioural problems.

4. Analysis of quantitative data

In this chapter, demographic information about the participants and the descriptive statistics of the questionnaire are reported. This chapter deals with the quantitative results of the study, and the subsequent chapter will deal with the qualitative data from the open questions of the questionnaire and the semi-structured interviews, as mentioned in the previous chapter. Statistical analysis of the questionnaire data has been performed to analyse the significant differences between the variables. This was an online questionnaire which consisted of different types of questions. The participants were asked about their demographic information and the number of pupils with whom they work, and there were seven point Likert-scale questions about the participants' perceptions of the role of ICT in the classroom, as well as questions asking them to rate the importance of various technological devices (e.g. smartboards, computers) for their teaching. The questionnaire can be accessed in the appendices section.

As explained earlier, a link to the online survey was provided and schools were invited through Facebook groups and JISC email lists which were relevant to education, but turnout was low. At the same time, researchers from the Institute of Education who are working with primary schools suggested inviting the teachers with whom they are working to participate. The turnout rate was also low, therefore a list of schools was obtained from local education councils, and all of the schools in this list were asked to invite their teachers. After this process was repeated twice, the questionnaire was sent to 140 participants. Participation was voluntary, but apart from the open-ended questions, all of the questions were made obligatory. The analysis followed the order of questions used in the questionnaire, as they are ordered in a logical manner, and the questions were grouped around various concepts and under separate sections in the questionnaire.

The questions were related to the research questions, as there were three main themes, which were as follows: the role of technology for educating pupils with

behavioural problems; collaborative learning among pupils with and without behavioural problems; and what kinds of practices are seen as effective teaching practices for teachers. There is a direct link between the questionnaire and the research questions when these themes are considered, and statistical analysis can help analyse the teachers' understanding of the role of ICT in their profession. The statistical analysis which will be used is a one-way analysis of variances (ANOVA) for inferential statistics. There is an assumption when using ANOVA that there should be normal distribution in the data, but it can be used if there is a violation of normality (Rumrill et al., 2020). Therefore, ANOVA has been used, although there is an abnormal distribution in the variables. Also, the post-hoc analysis Tukey honestly significant difference (HSD) test has been performed to see the differences between the variables when there was a statistically significant differences between variables. The Tukey HSD test is used to confirm where the differences occur between variables (Rumrill et al., 2020). When there are two variables, a test can be performed, and an independent sample t-test is used to analyse the differences between two groups' scores, so the analysis will make no difference in terms of significant difference between variables (Pallant, 2016).

4.1 Demographic information about the participants

The youngest participant was 22 and the oldest was 62, and the mean score of the participants' ages was 36.81. The group can be considered as young, and they were classified as 21-26, 27-32, 33-38, 39-44, 45-50, 51-56 and 57-62, as can be seen in Figure 1. 32 male participants (22.9%) and 108 female participants (77.1%) were involved. The number of female participants was higher than the number of male participants. According to Towers (2017), recruiting male teachers for a study in London or in other parts of England is difficult, and they are not keen to participate in surveys and interviews, but females are generally keen to participate. Also, according to the 2015 school workforce census (2016), 84.8% of teachers were female in nurseries and primary schools, so this is the demography in the UK in general, and this study therefore reflects the demography.

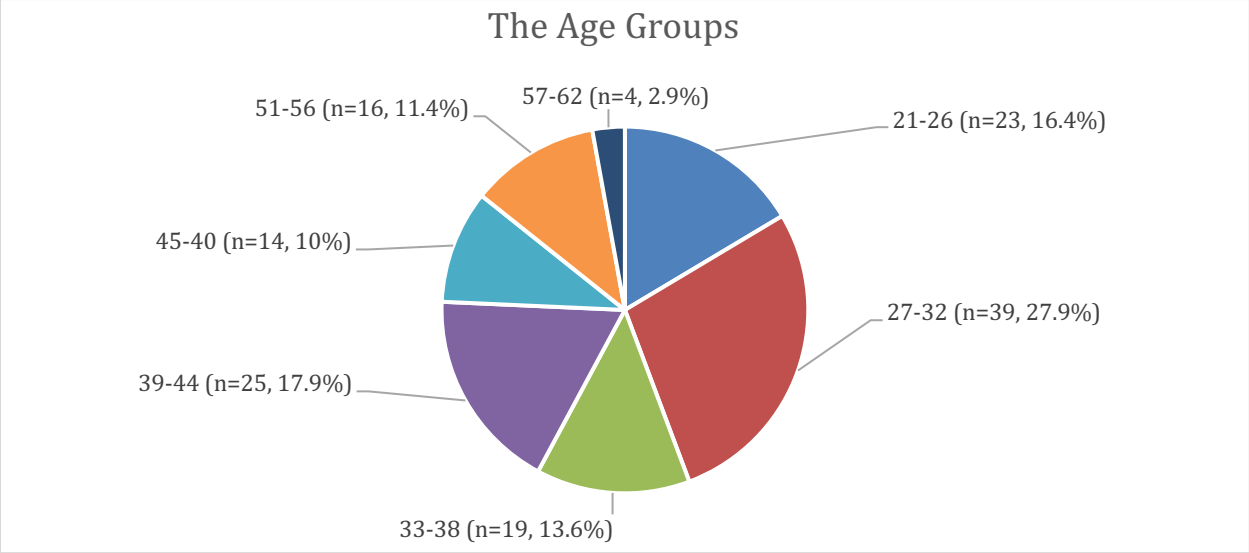

Figure 1: The distribution of age groups of the participants

The participants were asked for how long they have been actively teaching, and there are different levels of experience ranging from one year to 40 years. The mean score for experience is 10.23. The participants were also grouped in order to be able to carry out a statistical analysis. The table below shows how they were grouped and the number of participants for each group. It shows that the participants were young, and that more than half of the participants had less than ten years' experience.

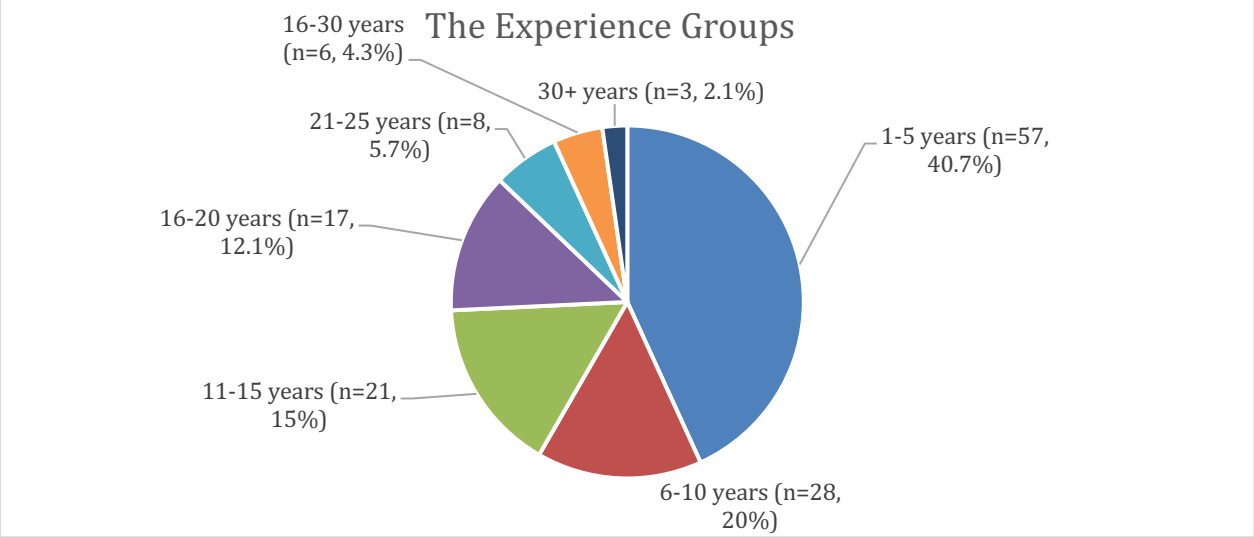

Figure 2: The distribution of the experience groups of the participants

The participants were asked about their highest qualifications. 99 of the participants (70.7%) held a bachelor's degree, 29 (20.7%) had a master's degree, and 12 (8.6%) had the PGDip diploma at the time of data collection. There were no participants with a doctorate degree. There was no statistically significant difference between the qualification groups for any question, according to the one-way ANOVA.

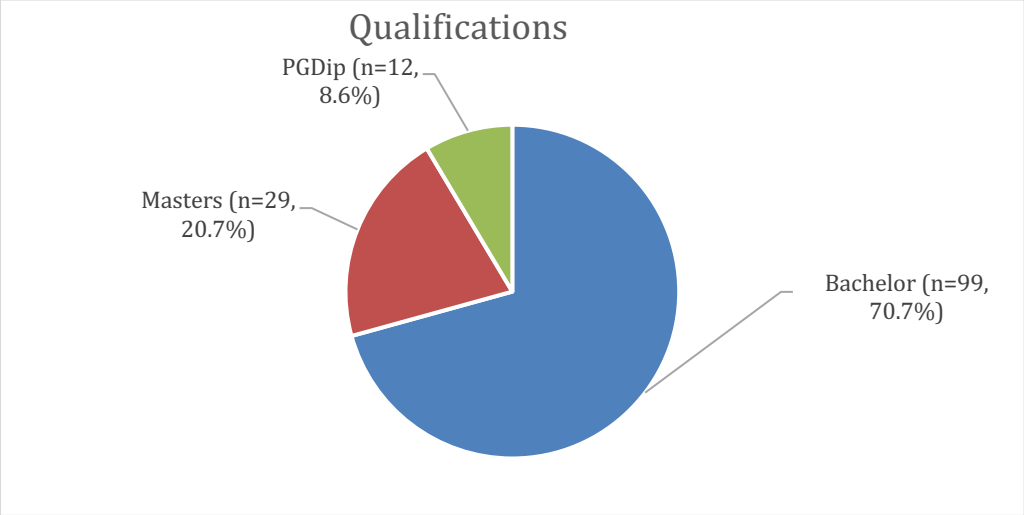

Figure 3: The distribution of qualifications of the participants

A list of subjects was provided from which the participants could choose, along with other options as well. The list went beyond the list that was provided, and there were subjects from fine art to sports coaching, music, special education and law. They were classified under four headings: education, social sciences, arts and humanities, and maths and sciences. Education was categorised as a different group from social sciences because the questionnaire has an educational focus, but psychology was placed under social sciences. If education were to be combined with social sciences the number would be 89 (63.6%). The number of teachers working in arts and humanities subjects was also high, at 45 (32.1%), but for maths and sciences it was only six (4.3%). The frequency for each subject group is presented in the table below. There was no statistically significant difference between the subject groups for any question, according to the one-way ANOVA.

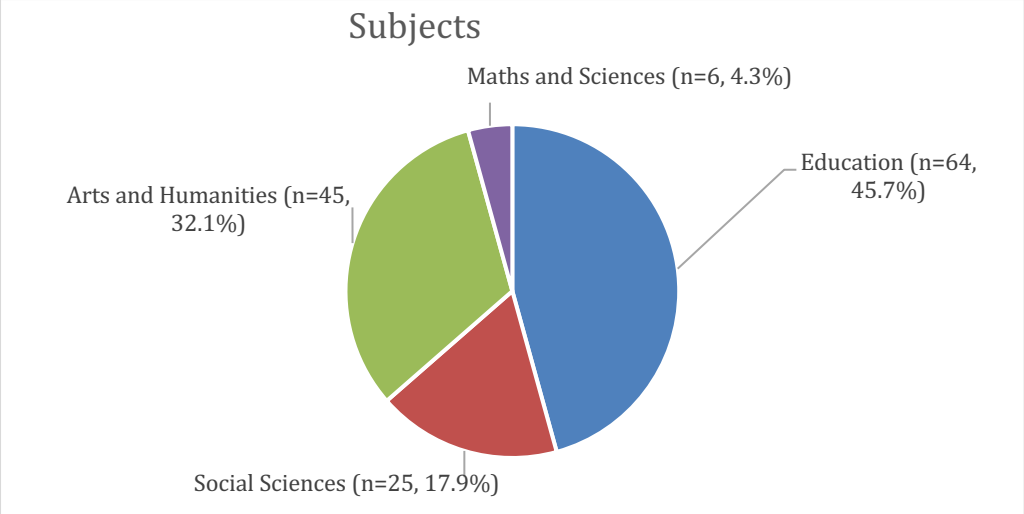

Figure 4: The distribution of the subjects of the particiapants

The teachers were also asked how many classes they teach or support. Most of the teachers said that they teach one classroom, but some said that they teach more than one classroom. There is no information about what kind of role they have with regards to teaching other classrooms. A question about the size of the classrooms was also asked, and the number of pupils was stated to be generally around 30. Their classrooms have between eight and 40 pupils. In addition, the teachers were asked how many pupils with SEND they support or teach, and there were only three teachers who answered zero, so generally the teachers involved have experience of working with pupils with SEND. Furthermore, the teachers were asked which type of SEND pupils they are working with or have worked with. The list of SEND groups was taken from the SEND Code of Practice 2015, and the teachers ticked the names of the groups with which they have worked. It can be seen from the table below that in mainstream classrooms the prevalent SEND groups are behavioural, emotional and social difficulties (76.4%), autism (73.6%), specific learning difficulties (67.9%), moderate learning difficulties (67.1%), and speech, language and communication needs (64.3%). The teachers involved in this survey stated that they have less experience with other SEND groups such as visual impairments, hearing impairments and physical disabilities. This provides a picture of mainstream British classrooms, as the survey was open to all KS2 teachers.

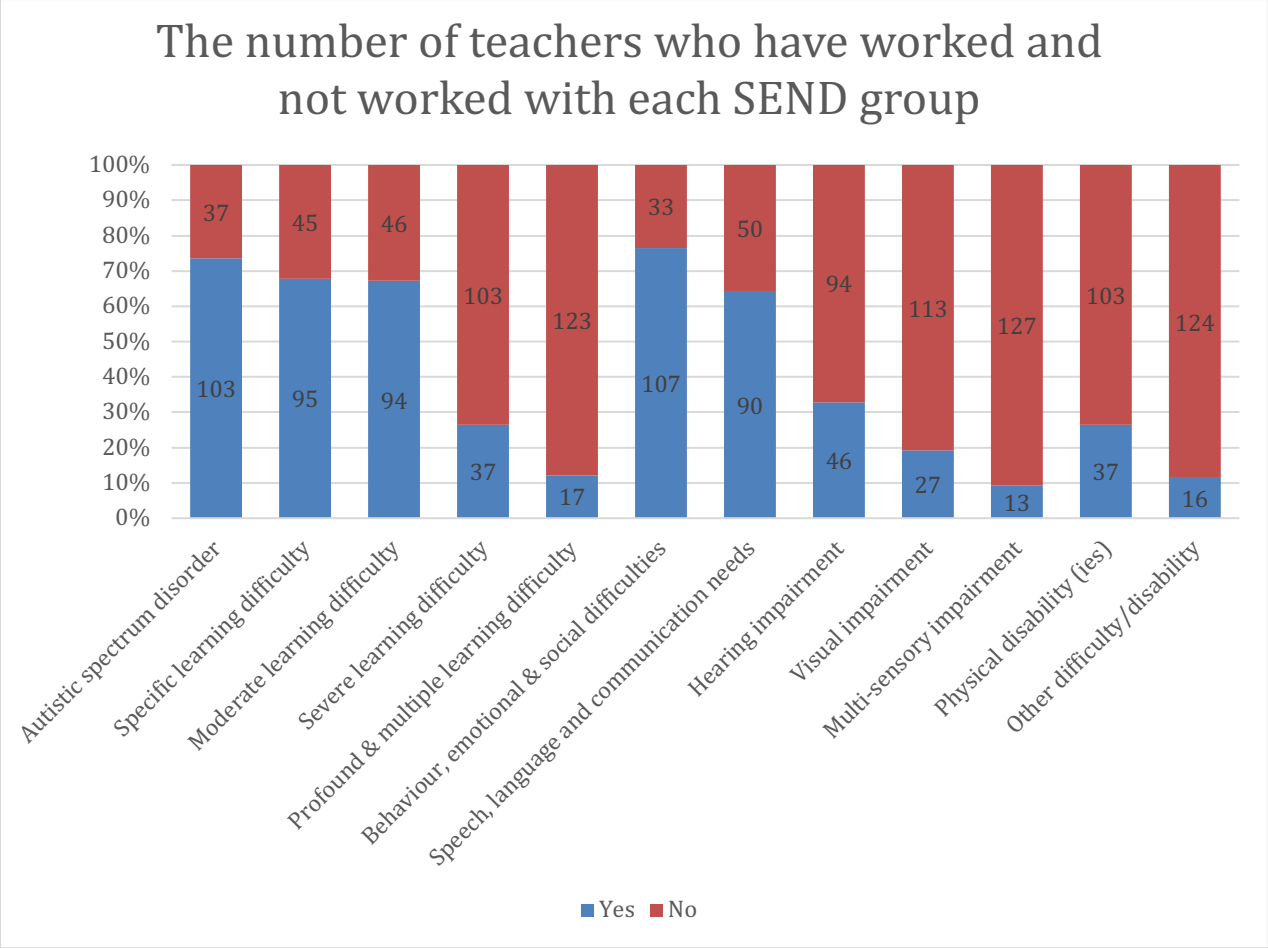

Figure 5: The number of teachers who have worked and not worked with each SEND group

4.2 The role of technological devices

There are different technologies in the classroom, so eight types of technologies were listed, and the teachers were asked to rate their importance from one (absolutely unimportant) to seven (extremely important). The 'not applicable' option was also available, and in the statistical analysis it was scored as 0 (zero), so it pulled down the means to reflect the position of the device in general, because when a teacher who does not use that particular device answered 'not applicable', it could mean that they do not find it essential for their teaching practices. The highest score (5.59) was given to smartboards, and only eight (5.7%) participants scored it 'not applicable' (0). The second highest score (4.82) was given to laptops, and the number of 'not applicable' answers was also low, at nine (6.4%). Tablets also scored

highly (4.31), and the number of ‘not applicable’ answers was 18 (12.9%). For technologies such as gaming consoles (n=75, 53.6%), smartphones (n=68, 48.6%), accessibility technology (n=53, 37.9%) and music technology (44, 31.4%), the number of ‘not applicable’ answers was high, and the mean scores were low, as can be seen in the table below.

Table 6: The mean score and the number of ‘not applicable’ answers for each device

Technology	Mean score	Number of ‘not applicable’ answers
Laptops	4.82	9 / 6.4%
Desktops	3.55	26 / 18.6%
Tablets	4.31	18 / 12.9%
Smartphones	1.19	68 / 48.6%
Gaming consoles	.73	75 / 53.6%
Smartboards	5.59	8 / 5.7%
Music technology	2.66	44 / 31.4%
Accessibility	2.44	53 / 37.9%

technology

For these eight technologies, a one-way ANOVA has been used to see whether there is a statistically significant difference between the sexes. There was no statistical difference between the mean scores of the female and male participants, as determined by the one-way ANOVA for laptops, tablets, smartphones, gaming consoles, smartboards, music technology and accessibility technology; however, there was a statistical difference between the mean scores of the female and male participants for desktops, according to the one-way ANOVA [$F(108, 32) = 6.188$, $p = .014$]. The male participants rated desktops as more important (M=4.53, SD=2.369) than the female participants did (M=3.26, SD=2.588). Both groups gave high importance to laptops (M=4.82, SD=2.270) and tablets (M=4.31, SD=2.420), and the most important device for both groups was smartboards (M=5.59, SD=2.323). However, accessibility technology (M=2.44, SD=2.560) and music technology (M=2.66, SD=2.413) were not deemed to be very important. Smartphones (M=1.19, SD=1.791) and gaming consoles (M=.73, SD=1.150) were the least important technologies for these teachers (Table 6).

There was a statistically significant difference in terms of rating the importance of smartboards between the 30+ years' experience group (n=3) and all of the other experience groups. Although three participants are not a big number in terms of a statistical comparison with the other experience groups, older teachers give less importance to smartboards compared to younger teachers. Younger teachers use more visual material, and a smartboard is required to present visuals.

4.3 The use of internet-based resources

The teachers were also asked whether they use internet-based resources, and six of the participants (4.3%) replied 'no'. As a follow up to this question, the participants were asked what the three main internet-based resources are for them. 130 of the participants filled in this question, some of whom wrote full sentences explaining the

purpose of using online resources such as finding images. The full sentences were analysed later with the qualitative data. The most mentioned online resources were Twinkl (44), YouTube (31), TES (26), Google for emails, cloud and image searches (23), BBC (15), Testbase (12), Mathletics (12), Purple Mash (10), Primary Resources (9), and Espresso (9) (to see a full list of the websites and their purposes, go to Appendices). In addition to that, many other websites were referenced by the teachers with regards to teaching literacy (such as Literacy Shed, Oxford Owl, Vocab Ninja and dyslexia screening tools), maths (such as Big Maths, My Maths and Maths Mastery), science (such as Khan's Academy), educational games (such as Kahoot), coding (such as Scratch and other websites), and monitoring (such as ClassDojo and Classroom Monitor). These were the online resources that were mentioned more than once by the teachers.

The next sections of the online survey were focused on gathering data on the teachers' understanding of using ICT for educational practice and the role they associate with ICT for their profession, with seven-point Likert-scale questions. There were four sections in total, including 37 seven-point Likert questions. The first section was on perceptions of ICT, the second section was on the role of ICT in effective teaching, the third section was on the role of ICT in supporting pupils with SEND, and the last section was on ICT and teaching.

4.4 Likert scale questions

As mentioned before, seven-point Likert-scale questions were used, and each response has been coded for analysis: 'strongly disagree' is coded as -3; 'disagree' is coded as -2; 'somewhat disagree' is coded as -1; 'neither agree nor disagree' is coded as 0; 'somewhat agree' is coded as 1; 'agree' is coded as 2; and 'strongly agree' is coded as 3.

4.4.1 Perception of ICT

For the statement ‘I think ICT skills are important for all teachers (including non-specialist)’, the mean score for all participants was 2.37, and the cumulative percentage for ‘strongly disagree’, ‘disagree’, ‘somewhat disagree’ and ‘neither agree nor disagree’ was 2.1%, which shows that the teachers were very positive towards the role of ICT in their teaching.

For the statement ‘I think technology can improve the teaching practice’, the mean score for all participants was 2.06. The cumulative percentage for ‘strongly disagree’, ‘disagree’, ‘somewhat disagree’ and ‘neither agree nor disagree’ was 5%, so, like the previous statement, they were positive about this statement as well. Furthermore, for this statement there was a statistically significant difference between teachers who have worked and those have not worked with pupils with specific learning difficulties, according to the one-way ANOVA [$F(138, 1) = 4.412$, $p = .038$]. The mean score for those who have worked with SEND pupils was 2.18, and for those who have not it was 1.80.

For the statement ‘I think technology can improve learning experience’, the mean score was 2.15, and the cumulative percentage for ‘strongly disagree’, ‘disagree’, ‘somewhat disagree’ and ‘neither agree nor disagree’ was 4.3%. The teachers were positive about the role of ICT in learning.

For the statement ‘I believe that the role of ICT in the classroom is generally seen in my school as positive and important’, the mean score for all participants was 1.61. The teachers were neither on the negative side nor the neutral side, as the cumulative percentage for ‘strongly disagree’, ‘disagree’, ‘somewhat disagree’ and ‘neither agree nor disagree’ was 10.7%, but the mean score was low because they were not on the ‘strongly agree’ side for this statement. Furthermore, there was a statistically significant difference for this statement between those teachers who have worked with pupils with behavioural, social and emotional difficulties and those who have not, according to the one-way ANOVA [$F(138, 1) = 5.712$, $p = .018$]. There

was also a statistical difference for those teachers who have worked with pupils with profound and multiple learning difficulties and those who have not, according to the one-way ANOVA [F(138, 1) = 4.283, p = .040]. The mean score for those who have worked with such pupils was 2.18, and for those who have not it was 1.54. This was also the case for teachers who have worked with pupils with speech, language and communication needs and those who have not, according to the one-way ANOVA [F(138, 1) = 9.705, p = .002]. The mean score for who have worked with such pupils was 1.84, and for those who have not it was 1.20.

For the statement 'I try to stay abreast of the latest developments in the field of ICT', the mean score for all participants was 1.11. The teachers were inclined towards the positive side, but there were 18 (12.9%) neutral participants, and the cumulative percentage for 'strongly disagree', 'disagree' and 'somewhat disagree' was 12.1%.

For the statement 'ICT can offer an enriched experience across the whole curriculum and prepare the students for the future', the mean score for all participants was 1.95. The teachers were positive towards this statement as well, as the cumulative percentage for 'strongly disagree', 'disagree', 'somewhat disagree' and 'neither agree nor disagree' (n=10, %7.1) was 9.3%, so the disagreements were low.

In this section, the lowest score was for the statement 'Teaching and learning is reliant on ICT', and the mean score for all participants was .14. There was a tendency towards the middle ground, and the neutral responses were high as well (n=27, 19.3%). It can be seen from the table below that there was a disagreement among the teachers in terms of this statement. Furthermore, for this statement there was a statistically significant difference between those teachers who have worked with pupils with moderate learning difficulties and those have not, according to the one-way ANOVA [F(138, 1) = 4.861, p = .029]. The mean score for who have worked with such pupils was -.10, and for those who have not it was .61.

Table 7: Descriptive statistics for the statement 'Teaching and learning is reliant on ICT'

Value	-3	-2	-1	0	1	2	3
Number	10	24	17	27	26	20	16
Percentage	7.1	17.1	12.1	19.3	18.6	14.3	11.4

For the statement 'The future of education almost certainly appears to be strongly technology-based', the mean score for all participants was 1.51, and the teachers were inclined towards the positive end of the scale. The cumulative percentage for 'strongly disagree', 'disagree' and 'somewhat disagree' was 7.9%, and for the neutral answer it was 8.6% (n=12). This shows that the teachers had a positive tendency towards this statement, but they did strongly agree that education will be strongly technology-based in the future.

For the statement 'Pupils are better engaged in ICT-based teaching activities', the mean score for all participants was 1.03. The number of 'neither agree nor disagree' answers was 33 (23.6%), but the cumulative percentage for 'strongly disagree', 'disagree' and 'somewhat disagree' was not very high (12.9%). Even though the teachers were not inclined towards the negative answers, the score was low because of the number of neutral teachers. Furthermore, for this statement there was a statistically significant difference between those teachers who have worked with pupils with moderate learning difficulties and those who have not, according to the one-way ANOVA [$F(138, 1) = 5.823$, $p = .017$]. The mean score for those who have worked with such pupils was .82, and for those who have not it was 1.46. There was also a significant difference between teachers who have worked with pupils with hearing impairments and those who have not, according to the one-way ANOVA [$F(138, 1) = 3.947$, $p = .049$]. The mean score for those teachers who have worked with such pupils was .67, and for those who have not it was 1.20.

4.4.2 The role of ICT in effective teaching

In this section there were ten questions related to the role of ICT in effective teaching, and the mean score for all participants for the first statement, which was 'ICT promotes collaborative working among pupils', was .83. The teachers slightly

agreed with this statement, and there were differences among the groups in terms of agreeing with this statement. There was a statistically significant difference between age groups for this statement, according to the one-way ANOVA [F(133, 6) = 4.268, p = .001]. To see the difference between the groups, a post-hoc analysis Tukey HSD test showed that there is a statistically significant difference between the 45-50 age group and the four younger age groups (21-26; 27-32; 33-38; 39-44), but there was no statistically significant difference between the 45-50 age group and the older groups (51-56; 57-62). The mean for the groups is listed in the table below. As the age goes up, the mean score goes down, but the 45-50 age group had lower scores than the 51-56 and 57-62 groups. Furthermore, the mean score for the 21-26 group (M=1.00) was lower than that of the 27-32 (M=1.15) and 33-38 (M=1.32) groups.

Table 8: Descriptive statistics for the statement 'ICT promotes collaborative working among pupils'

Age group	Number	Mean	Experience group	Number	Mean
21-26	23	1.00	1-5	57	1.05
27-32	39	1.15	6-10	28	1.14
33-38	19	1.32	11-15	21	1.29
39-44	25	1.08	15-20	17	.59
45-50	14	-.50	21-25	8	-.87
51-56	16	.13	26-30	6	-.33
57-62	4	.25	30+	3	-1.33

Total	140	.83	Total	140	.83

Table 9: One-way ANOVA of the different experience groups for the statement 'ICT promotes collaborative working among pupils'

	Sum of squares	df	Mean square	F	Sig.
Between groups	56.337	6	9.389	5.637	.000
Within groups	221.549	133	1.666		
Total	277.886	139			

There was a statistically significant difference between the experience groups for this statement, according to the one-way ANOVA [F(133, 6) = 5.637, p = .000], as was the case for the age groups. To see the difference between the groups, a post-hoc analysis Tukey HSD test showed that there was a statistically significant difference between the 21-25 age group and the three shortest experience groups (1-5; 6-10; 11-15), as well as between the 30+ years' experience group and these three experience groups (1-5; 6-10; 11-15). In the table above, the descriptive statistics show that the more experienced teachers had lower scores in terms of agreeing with this statement. The mean for the groups is listed in the table as follows: 1-5 years (M=1.05), 6-10 (M=1.14), 11-15 (M=1.29), 15-20 (M=.59), 21-25 (M=-.87), 26-30 (M= -.33) and 30+ (M=-1.33).

For the statement 'ICT has a positive impact on classroom management', the mean score for all participants was .82. The number of neutral teachers was 25 (17.9%),

and the cumulative percentage for ‘strongly disagree’, ‘disagree’ and ‘somewhat disagree’ was 15%. There were teachers who were not sure about the impact of ICT on classroom management, but they were generally on the positive side with regards to the impact of ICT on classroom management. There was not a statistically significant difference between the variables for this question, according to the one-way ANOVA.

For the statement ‘Information that I find online is not always reliable’, the mean score for all participants was 1.08, and the tendency was to agree with this statement. The number of ‘neither agree nor disagree’ answers was 16 (11.4%). There was not a statistically significant difference between the variables for this question, according to the one-way ANOVA.

For the statement ‘My students are more active during ICT-based activities compared to other activities’, the mean score for all participants was .14. It was not negative, but the score was very close to zero. The number of ‘neither agree nor disagree’ answers was 38 (27.1%), and the cumulative percentage for ‘strongly disagree’, ‘disagree’ and ‘somewhat disagree’ was 29.3%. The teachers did not agree that students are more active during ICT-based activities. There was not a statistically significant difference between the variables for this question, according to the one-way ANOVA.

The mean score for the statement ‘When I use ICT without planning the activity beforehand, it is difficult to control the activity’ was .64. There was a statistically significant difference between the age groups for this question, according to the one-way ANOVA [$F(133, 6) = 2.878$, $p = .012$]. A Tukey post-hoc test revealed that the 51-56 ($M=1.63$) age group had a higher score in agreeing with this statement compared to the 21-26 ($M=.13$) group [$F(23, 16) = -1.495$, $p=.027$)]. The descriptive statistics demonstrate that the older teachers had a tendency towards answering ‘neither agree nor disagree’, but for the 51-56 age group the mean score was 1.63, which means that they agreed with this statement.

Table 10: Descriptive statistics for the statement 'When I use ICT without planning the activity beforehand, it is difficult to control the activity'

Age group	21-26	27-32	33-38	39-44	45-50	51-56	57-62	Total
Number	23	39	19	25	14	16	4	140
Mean	.13	.51	.58	1.16	.07	1.63	.00	.64

For a similar statement, which is 'Internet-based activities that have not received prior planning are unsuccessful', the mean score for all participants was .65. In line with that, there was a statistically significant difference between the age groups for this statement, according to the one-way ANOVA [F(133,6) = 3.201, p = .006]. A Tukey post-hoc test revealed that the 21-26 age group disagreed with this statement (M=-.04), but the 33-38 age group tended to agree (M=1.26) [F(23, 16) = -1.307, p=.016]. There was also a statistically significant difference between the 21-26 (M=-.04) and 51-56 (M=1.19) age groups [F(23, 16) = -1.231, p=.044].

Table 11: Descriptive statistics for the statement 'Internet-based activities that have not received prior planning are unsuccessful'

Age group	21-26	27-32	33-38	39-44	45-50	51-56	57-62	Total
Number	23	39	19	25	14	16	4	140
Mean	.04	.56	1.26	.96	.14	1.19	.25	.65

For the statement 'Having access to the internet in the classroom is essential for effective teaching', the mean score for all participants was 1.29. The teachers were positive about the role of ICT in effective teaching, and the cumulative percentage for 'strongly disagree', 'disagree', 'somewhat disagree' and 'neither agree nor disagree' was 25%. There was not a statistically significant difference between the variables for this question, according to the one-way ANOVA.

For the statement ‘ICT has a negative impact on classroom management’, the mean score for all participants was -1.25, and there was disagreement on this statement, as can be seen from the mean score, but the number of ‘neither agree nor disagree’ answers was also high, at 31 (22.1%). This shows that there are teachers who are neutral about the impact of ICT on classroom management. For this statement there was a statistically significant difference, according to the one-way ANOVA [F(138, 1) = 4.215, p = .042], between those teachers who have worked with pupils with autism and those who have not.

Table 12: One-way ANOVA for the statement ‘ICT has a negative impact on classroom management’

	Sum of squares	df	Mean square	F	Sig.
Between groups	8.543	1	8.543	4.215	.042
Within groups	279.707	138	2.027		
Total	288.250	139			

The mean score for those who have worked with pupils with autism was -1.40, and for those who have not it was -.84. Teachers who have worked with such pupils had a lower tendency to agree with this question, as it can be seen in the crosstabulation table that those teachers who have worked with such pupils were inclined towards disagreeing with this question.

Table 13: Descriptive statistics for the statement 'ICT has a negative impact on classroom management' for teachers who have worked with pupils with autism and those who have not

	-3	-2	-1	0	1	2	3	Total	Mean
Yes	25	31	21	18	4	2	2	103	-1.40
No	7	6	6	13	2	3	0	37	-.84
Total	32	37	27	31	6	5	2	140	-1.25

For the statement 'Problem solving, analytical thinking and metacognitive skills can be taught with ICT more effectively', the mean score for all participants was .32. There was a tendency towards the middle ground for this statement, as the number of 'neither agree nor disagree' answers was 57 (40.7%), and as a result the mean score was towards the middle. For this statement, there was a statistically significant difference between the various experience groups, according to the one-way ANOVA [F(133, 6) = 5.653, p = .000].

Table 14: One-way ANOVA for the statement 'Problem-solving, analytical thinking and metacognitive skills can be taught with ICT more effectively'

	Sum of squares	df	Mean square	F	Sig.
Between groups	50.505	6	8.417	5.653	.000
Within groups	198.031	133	1.489		
Total	248.536	139			

Post-hoc Tukey HSD analysis shows that the difference between the experience groups occurred between the 21-25 (M=-1.12) group and the 1-5 (M=.51), 6-10

(M=.64) and 11-15 (M=.62) groups. There is also a statistically significant difference between the means of the 30+ years' experience (M=-2.33) group and the 1-5 (M=.51), 6-10 (M=.64), 11-15 (M=.62) and 15-20 (M=.29) groups. The experienced teachers tended to disagree with this statement.

Furthermore, for this statement there was a statistically significant difference between those teachers who have worked with pupils with moderate learning difficulties and those who have not, according to the one-way ANOVA [F(138, 1) = 4.291, p = .040]. The mean score for those who have worked with such pupils was .16, and for those who have not it was .65. There was also a significant difference between those teachers who have worked with pupils with hearing impairment and those who have not, according to the one-way ANOVA [F(138, 1) = 5.931, p = .016]. The mean score for those who have worked with such pupils was -.07, and for those who have not it was .51.

For the statement 'A student-centred approach can be employed more effectively with ICT', the mean score for all participants was .43. The number of 'neither agree nor disagree' answers was 47 (33.6%), and the cumulative percentage for 'strongly disagree', 'disagree' and 'somewhat disagree' was 18.6%. Furthermore, there was a statistically significant difference between the various age groups for this statement, according to the one-way ANOVA [F(133, 6) = 2.199, p=0.47]. In the post-hoc Tukey HSD test, the difference was between the 27-32 (M=.74, SD=1.292) and the 51-56 (M=-.56, SD=1.672) groups, and between the 39-44 (M=.72, SD=1.242) and the 51-56 (M=-.56, SD=1.672) groups. There was not a significant difference between the older group of 57-62 (n=4) and any of the other groups. In line with the age groups, there was a statistically significant difference between some of the experience groups according to the one-way ANOVA [F(133, 6) = 3.065, p = .008]. The difference (p=.049) was between the 5-10 years'(M=.71, SD=1.301) experience group and the 30+ years' (M=-1.67, SD=2.309) experience group.

4.4.3 The role of ICT in supporting pupils with SEND

In this section, there were questions about the role of ICT in supporting pupils with SEND, and about teachers' understanding of technology. For the statement 'Having pupils with SEND in my class makes teaching with ICT more difficult', the mean score for all participants was -.69. There were 23 (16.4%) teachers who somewhat agreed with the statement, and 37 (%26.4) teachers were neutral. This shows that there are some teachers who agreed (n=7, 5%) and some who strongly agreed (n=3, 2.1%) with this statement. For this statement, there was also a statistically significant difference between those teachers who have worked with pupils with autism and those who have not, according to the one-way ANOVA [F(138, 1) = 4.242, p = .041].

Table 15: One-way ANOVA for the statement 'Having pupils with SEND in my class makes teaching with ICT more difficult'

	Sum of squares	df	Mean square	F	Sig.
Between groups	9.846	1	9.846	4.242	.041
Within groups	320.325	138	2.321		
Total	330.171	139			

Those teachers who have worked with pupils with autism had a mean score of -.84, and for those who have not it was -.24. As can be seen from the table below, the teachers who have worked with pupils with autism tended to disagree with this statement, but the number of 'neither agree nor disagree' answers was also high for both groups.

Table 16: Descriptive statistics for the statement ‘Having pupils with SEND in my class makes teaching with ICT more difficult’

	-3	-2	-1	0	1	2	3	Total	Mean
Yes	16	30	9	24	19	4	1	103	-.84
No	7	6	6	13	2	3	0	37	-.24
Total	23	36	15	37	21	7	1	140	-.69

For the statement ‘ICT is important when specialist treatment and support is necessary for pupils with SEND’, the mean score for all participants was .81. The cumulative percentage for ‘strongly disagree’, ‘disagree’ and ‘somewhat disagree’ was 11.4% (n=16), but for ‘neither agree nor disagree’ the number was 38 (27.1%). This shows that the teachers were not certain towards this statement.

For the statement ‘Pupils with SEND and BP (behavioural problems) are better engaged in ICT-based teaching activities’, the mean score for all participants was .75. The cumulative percentage for ‘strongly disagree’ (n=0), ‘disagree’ (n=8) and ‘somewhat disagree’ (n=14) was 15.7%, but for ‘neither agree nor disagree’, the number was 35 (25%). The teachers were positive towards this statement, but the mean score was low, and the number of neutral teachers was high.

For the statement ‘ICT supports positive relationships between pupils with SEND and their peers’, the mean score for all participants was .69. Similar to the previous statement, the cumulative percentage for ‘strongly disagree’ (n=5), ‘disagree’ (n=4) and ‘somewhat disagree’ (n=12) was 8.6%, but for ‘neither agree nor disagree’ the number was high, at 40 (28.6%). The mean score was not very high, and the number of neutral teachers shows that there was an uncertainty towards this statement.

For the statement ‘ICT supports the academic learning of pupils with behavioural problems’, the mean score for all participants was .79. There was a similar tendency towards this statement, as the cumulative percentage for ‘strongly disagree’ (n=3), ‘disagree’ (n=6) and ‘somewhat disagree’ (n=9) was 12.9%, but for ‘neither agree nor

disagree' the number was high, at 35 (25%). There is an uncertainty about the role of ICT with regards to academic skills.

For the statement 'ICT is a negative catalyst for those with behavioural problems', the mean score for all participants was -.80. The participants did not agree with this statement, as the cumulative percentage for 'strongly disagree' (n=16), 'disagree' (n=33) and 'somewhat disagree' (n=26) was 53.6%, and the number of 'neither agree nor disagree' answers was high (n=42, 30%). Furthermore, for this statement, there was a statistically significant difference between the experience groups, according to the one-way ANOVA [F(133, 6) = 3.209, p = .006]. The post-hoc test shows that the difference was between the 11-15 years' experience (M=-1.52, SD=1.327) group and the 1-5 (M=-.49, SD=1.241) and 15-20 (M=-.12, SD=1.166) years' experience groups.

There was also a statistically significant difference for this question between those teachers who have worked with pupils with autism and those who have not, according to the one-way ANOVA [F(138, 1) = 5.109, p = .025], as shown in the table below.

Table 17: One-way ANOVA for the statement 'ICT is a negative catalyst for those with behavioural problems'

	Sum of squares	df	Mean square	F	Sig.
Between groups	8.940	1	8.940	5.109	.025
Within groups	241.460	138	1.750		
Total	250.400	139			

Those teachers who have worked with pupils with autism had a mean score of -.95, and for those who have not it was -.38. As can be seen from the table below, those teachers who have worked with pupils with autism tended to disagree with this statement, as well as those teachers who have not worked with pupils with autism, but the number of 'neither agree nor disagree' answers was also high for this question for both groups (n= 28 and 14).

Table 18: Descriptive statistics for the statement 'ICT is a negative catalyst for those with behavioural problems'

	-3	-2	-1	0	1	2	3	Total	Mean
Yes	15	26	19	28	12	3	0	103	-.95
No	1	7	7	14	6	2	0	37	-.38
Total	16	33	26	42	18	5	0	140	-.80

For the statement 'ICT helps diversify teaching for pupils with different needs', the mean score for all participants was 1.04. The teachers were positive about this statement, but the number of 'neither agree nor disagree' answers was high (n=31, 22.1%). Furthermore, for the statement 'ICT enables teachers to seek alternative solutions when planned activities become ineffective for pupils with SEND', the mean score was 1.16. The teachers were positive about the role of ICT in diversifying educational activities, and the number of 'neither agree nor disagree' answers was 22 (15.7%).

For the statement 'I employ multimodal ICT (media rich materials) when supporting pupils with BP (behavioural problems)', the mean score for all participants was .66. The cumulative percentage for 'strongly disagree' (n=4), 'disagree' (n=4), and 'somewhat disagree' (n=8) was not very high, at 11.4, but the number of 'neither agree nor disagree' answers was high (n=41, 29.3%). The number of positive responses was high, but the mean score was close to zero.

4.4.4 ICT and teaching

In this section, the teachers were asked about the ways in which they use ICT for educational activities. For the first statement, 'I often use ICT for my teaching preparation', the mean score for all participants was 2.36. 134 of the teachers (95.7%) were positive about this statement. This shows that ICT is important for teaching preparation. For the statement 'I often use ICT in the classroom', the mean score for all participants was 2.42. Like the previous statement, the teachers were positive, but there were four (2.9%) teachers who disagreed and two teachers (1.4%) who answered 'neither agree nor disagree'.

For the statement 'When needed I perform internet searches whilst teaching', the mean score for all participants was 1.77. The teachers were positive about this statement, as the cumulative percentage for 'strongly disagree' (n=2), 'disagree' (n=3) and 'somewhat disagree' (n=6) was 7.9%, and the number of 'neither agree nor disagree' answers was four (2.9%). However, there was a statistically significant difference among the age groups for this statement, according to the one-way ANOVA [F(133, 6) = 2.652, p=.018]. The post-hoc Tukey HSD test reveals that the significant difference was between the 51-56 (M=.88, SD=1.455) age group and the 21-26 (M=2.13, SD=1.100) and 27-32 (M=2.18, SD=.970) age groups. It demonstrates that there is a tendency to perform internet searches in the classroom during teaching activities. The younger teachers stated that they are more willing to perform internet searches during teaching activities. There was no statistically significant difference for all of the other questions and for rating the importance of technological devices.

Similarly, there was a statistically significant difference between the experience groups as well for this statement, according to the one-way ANOVA [F(133, 6) = 4.350, p = .000]. The post-hoc Tukey HSD test shows that the difference is between the 1-5 (M=2.12, SD=1.001) years' experience group and the 15-20 (M=.88, SD=1.691) years' experience group. Furthermore, for this statement there was a statistically significant difference between those teachers who have worked with

pupils with specific learning difficulties and those have not, according to the one-way ANOVA [F(138, 1) = 4.531, p = .035]. The mean score for those who have worked with such pupils was 1.61, and for those who have not it was 2.11. There was also a statistically significant difference for those teachers who have worked with pupils with hearing impairment and physical disabilities and those who have not.

For the statement 'I often use video resources for my teaching', the mean score for all participants was 2.06. The teachers were positive about this statement, as four teachers (2.9%) replied 'somewhat disagree', and four teachers (2.9%) replied 'neither agree nor disagree'. Furthermore, for this statement there was a statistically significant difference between those teachers who have worked with pupils with severe learning difficulties and those who have not, according to the one-way ANOVA [F(138, 1) = 4.123, p = .044]. The mean score for those who have worked with such pupils was 1.78, and for those who have not it was 2.16.

For the statement 'I often need guidance for integrating ICT into teaching', the mean score for all participants was -.51. The number of teachers who stated that they do not think they need to have guidance to integrate ICT into teaching was higher than those who said that they think they do, as the answers were as follows: 'strongly disagree' (n=16, 11.4%), 'disagree' (n=33, 23.6%), 'somewhat disagree' (n=30, 21.4%), 'neither agree nor disagree' (n=18 12.9%), 'somewhat agree' (n=21, 15%), 'agree' (n=14, 10%) and 'strongly agree' (n=8, 5.7%).

For the statement 'I feel skilled to integrate ICT into my teaching', the mean score for all participants was 1.69. This statement was in line with the previous one, but the teachers were more positive towards this statement. They said that they feel skilled in terms of integrating ICT into their educational activities. For this statement, there was also a statistically significant difference between those teachers who have worked with pupils with autism and those who have not, according to the one-way ANOVA [F(138, 1) = 4.164, p = .043].

Table 19: One-way ANOVA for the statement 'I feel skilled to integrate ICT into my teaching'

	Sum of squares	df	Mean square	F	Sig.
Between groups	4.974	1	4.974	4.164	.043
Within groups	164.819	138	1.194		
Total	169.793	139			

The teachers tended to agree with this statement, and for those who have worked with such pupils the mean score was 1.81, and for those who have not it was 1.38. The number of 'somewhat agree' responses was high (n=40), which shows that the teachers need additional support to feel confident in terms of integrating ICT.

For the statement 'The internet is my main resource when preparing my teaching', the mean score for all participants was 1.37. The cumulative percentage for 'strongly disagree' (n=3), 'disagree' (n=6) and 'somewhat disagree' (n=7) was 11.4%, and the number of 'neither agree nor disagree' answers was 17 (12.1%), which shows that the teachers think that the internet is an important part of their profession. Furthermore, for this statement there was a statistically significant difference between those teachers who have worked with pupils with severe learning difficulties and those who have not, according to the one-way ANOVA [$F(138, 1) = 6.579$, $p = .011$]. The mean score for those who have worked with such pupils was .84, and for those who have not it was 1.56.

For the statement 'I often give ICT-based homework', the mean score for all participants was .06. The score was low because the distribution of answers was reasonably evenly spread: 'strongly disagree' (n=13, 9.3%), 'disagree' (n=20, 14.3%), 'somewhat disagree' (n=22, %15.7), 'neither agree nor disagree' (n=23 16.4%), 'somewhat agree' (n=25, 17.9%), 'agree' (n=27, 19.3%) and 'strongly agree'

(n=10, 7.1%). However, the number of teachers who agreed with the statement was higher than the number of those who disagreed.

For the statement ‘The homework that I give requires searching the internet’, the mean score for all participants was -.11. The number of ‘neither agree nor disagree’ answers was 34 (24.3%), and the cumulative percentage of agree answers was 37.9%, whilst the percentage of disagree answers was 37.9%. Similar to the previous statement, there was an even distribution for this statement as well.

4.5 Summary

The analysis of the questionnaire has provided a general picture of the role of ICT in primary classrooms and how teachers position ICT with regards to performing their job. The results demonstrate that ICT is commonly used in classrooms and teachers employ applications and websites to provide resources and perform their profession. The highest score for the importance of a device was given to smartboards, with laptops second and tablets third. These are the most essential ICT devices in the classroom. The participants in this study were positive about the role of ICT for improving teaching and learning practices, and they said that they think that ICT is essential when it comes to supporting pupils with different needs, but they did not explain how they use it to improve their practice and the experience of pupils with and without SEND. This will be further analysed with the qualitative data that has been gathered via the open questions asked in the questionnaire and interviews.

The teachers claimed that they follow the latest developments in the field of ICT, however, as will be discussed in the next chapters, they have difficulties in following the newest devices and deciding how to integrate them. The participants did not agree that teaching is reliant on ICT, but they did state that they think that the future of education is ICT-based. Also, they said that they think it enhances their experiences of being prepared for the future, so there is an overemphasis on the significance of ICT with regards to being prepared for life. The teachers were positive about the statements ‘Pupils are better engaged with ICT’ and ‘ICT promotes

collaborative work', but the mean scores of the age groups tended to decline as the age increased. They were positive about the impact of ICT on classroom management, but the score for the statement 'Pupils are more active during ICT-based activities' was low, and the number of neutral participants was high. The younger teachers were more positive about using ICT or internet-based activities without prior planning compared to the older teachers. The score was close to zero for the statement 'ICT supports a student-centred approach and promotes meta-cognitive and problem-solving skills.' They were positive about the internet being essential for teaching, but they agreed that there is misinformation online when looking in their response to open questions.

The teachers said that they see ICT as essential for specialist treatment, and they did not agree that having pupils with SEND makes teaching difficult, but the number of neutral responses was high, so these teachers need support to use ICT more effectively. The participants were inclined towards the middle for the role of ICT in promoting positive relationships among pupils with and without challenging behaviours, and also for the statement 'Pupils with behavioural issues are better engaged'. They agreed that ICT is supportive for promoting academic skills and can help to diversify teaching, but the score for using multimedia when teaching pupils with different needs was low. They stated that they often use ICT for their teaching, and they perform internet searches in the classroom, but the younger teachers' score was higher than that of the older teachers. The teachers claimed that they feel skilled when integrating ICT, but they did agree that they need guidance. Moreover, those teachers who have worked with pupils with autism were more positive than those who have not. Videos are commonly used, and they revealed that they see the internet as a main resource when preparing for teaching, but the score for giving ICT- and internet-based homework was towards the middle.

This chapter has provided a general response to the three research questions, as it demonstrates how ICT is positioned by teachers and whether they see it as essential for promoting effective teaching and collaborative learning. Therefore, in the next chapters I will analyse the qualitative data to understand better the role of ICT in

supporting pupils with and without SEND. The participants will provide a detailed account of their use of ICT in the classroom and reflect on the role of ICT in their educational activities, and how it shapes their classroom as a part of their everyday routine.

5. Analysis of qualitative data

There are two sources of qualitative data for this study: one is information gathered through the questionnaire by providing open questions at the end of the questionnaire, and the other source is interviews. In this chapter, the qualitative data from the questionnaire's open questions and interviews are analysed together. All of the participants were from primary schools, because the focus was on the role of ICT in upper primary schools and how the participants make meaning of ICT for their profession. When the participants in the questionnaire are cited, the demographic information is provided in the text, but the demographic information on the interview participants is also provided below to make clear their backgrounds. The teacher participants were coded as Teacher1, Teacher2 and so on, and the SENCO participants were coded as SENCO1, SENCO2 and so on.

SENCO1: West London, Female, 30-35 age group

SENCO2: South London, Female, 35-40 age group

SENCO3: North London, Female, 40-45 age group

SENCO4: South London, Male, 35-40 age group

SENCO5: North London, Female, 35-40 age group

Teacher1: North London, Female, 30-35 age group, Year 3

Teacher2: South London, Male, 30-35 age group, Year 4

Teacher3: South London, Female, 40-45 age group, Year 6

Teacher4: North London, Female, 45-50 age group, Year 4

Teacher5: North London, Male, 25-30 age group, Year 6

Teacher6: South London, Female, 30-35 age group, Year 3

Teacher7: South London, Female, 35-40 age group, Year 4

In the questionnaire, each question created a theme in line with the research questions, therefore to demonstrate how the semi-structured interviews were built on the questionnaire, a map of the questionnaire themes is listed in the following paragraph. This will help to create a link between the questionnaire and the semi-structured interviews, and these three different sources of data (the questionnaire, open survey questions, and semi-structured interviews) will be analysed in the discussion chapter. Using different types of data provides a more detailed picture of educational practices in the classroom. However, whilst it can be seen that there are similarities between the themes of these two different data sources, the semi-structured interviews were more detailed as there was a conversation going on, so I was able to ask the participants further questions in order to get more details.

The themes that emerged from the questionnaire's open questions are listed here to give a sense of how the interviews were built on the questionnaire data. Inclusive education that is sensitive towards specific needs and a constructivist approach is preferred rather than the behaviourist reward and sanction approach, but there were teachers who suggested using behaviourism when dealing with pupils with behavioural problems. Multimodality is a central theme, so the participants frequently referred to visualisation through games and videos. They use technology as a hook to engage pupils in activities, and they use technology as reward to motivate pupils. These features were found to be appealing to pupils with SEND, specifically those with behavioural issues. The participants commonly stated that ICT is interactive and collaborative. The disadvantages were listed as technical problems, misinformation, fake news, inappropriate websites/content, and as a result off-task behaviour. With ICT, the teachers' job is easier, pupils are independent, they have access to a vast amount of resources, and they are more productive with ease and connectivity, so the teacher is not a facilitator anymore. The new classroom is a connected classroom, so with this flexibility pupils can make themselves heard in society.

When creating an ICT-based curriculum, it should reflect learner need in the technological era, so as to develop a creative classroom with researching skills and metacognitively enhanced pupils. To meet the needs of pupils with challenging behaviours, activities need to be planned carefully and pupils need to be monitored closely and guided, and pupils need to be given responsibilities. There is a lack of evidence-based educational practice due to a limited budget, support, time and experience, so the teachers stated that they need to be supported to develop the skills to integrate ICT effectively. Applications such as Kodu, Scratch, Purple Mash and ClassDojo, as well as blogging and virtual reality technology, have been suggested by the teachers as an example of the creative use of ICT. Applications called Popplets and Google Docs and creating movie trailers and slides were found to be successful collaborative activities. Educational websites and applications were frequently cited as supporting academic and social skills, as there are applications for specific purposes, for example for language skills, communication and maths skills.

In the next section, it will be seen that there is a link between the questionnaire themes and the interview themes; however, the interviews went beyond the questionnaire and have provided an insight into the role of ICT for these teachers. There are also insights into how the teachers make meaning of each point, and this is the product of the conversations between the researcher and the participants. In the next section, the qualitative data will be analysed together, and they will be linked when they have commonalities around a theme. The themes are as follows.

5.1 The understanding of Behavioural Problems

In the questionnaire, the teachers were asked how they distinguish behavioural problems and SEND. For some of the teachers (seven female teachers and one male teacher from different parts of England, mostly London), there are SEND related behavioural problems and general behavioural problems that are related to management and relationships, because pupils in the latter group choose to misbehave. In the questionnaire, some of the teachers stated that they find

behaviours problematic and see the behaviourist approach of reward and punishment as a solution, but the general approach is to employ specialised support for these pupils' needs.

General behavioural problems in schools include fighting, relationship issues and communication problems. 'The majority are some friendship issues, or some refusing to follow the instructions,' said SENCO4. The 2015 Code of Practice changed the approach to behavioural problems, such that behaviour is classified under social, behavioural and emotional needs. In primary school, pupils with behavioural problems generally display 'low-level disruption, talking, fidgeting, not focusing; those are common general issues in most classes' (SENCO3). There are also behavioural issues that stem from pupils with a SEND diagnosis (SENCO4).

> In the SEN Code of Practice, behaviour itself isn't a separate category. So, historically and before the 2015 Code of Practice, you could say this child has behavioural needs. We don't say that anymore, and in the 2015 Code of Practice there is social and emotional needs, behaviour kind of goes in there. But the category is social emotional needs. (SENCO5)

Pupils with SEN can have behavioural issues when their needs are not met, therefore there is an underlying reason for these behavioural issues. If a child, for example, is always being told off, their self-esteem is going to drop, and they will react badly (SENCO1). Instead of telling them off, they should be occupied with engaging educational activities such as 'giving them a special job or just taking them for a walk' (SENCO1). SENCO2 claimed that their school supports pupils with SEN very effectively, and it is an inclusion flagship because they engage pupils in educational activities, but pupils with behavioural problems can be distracted very easily, which results in a delay in learning.

> A lot of children with special needs will find it hard to communicate with others or might not understand what the other children are doing. So, they often do have behavioural needs that are a bit more extreme than the children without special

> needs. We do give them a bit of leeway (...), but they do still need to know how to behave. (SENCO1)

The use of technology can cause behavioural problems, because some pupils often use their phones all night. Some pupils therefore come to school very tired (Teacher3). They might bring the problems they have experienced over their social media accounts into the classroom. SENCO2 also stated that they have issues that come out of the games they play because pupils imitate these games in the classroom and playground by pretending to be characters from a fighting game. There are language issues, bullying and tiredness.

> They come in very tired because they've been playing games, or they have a few hundred messages overnight on their phones from their WhatsApp groups. And there's bullying, so the bullying comes into school as well. (Teacher3)

There are behavioural issues with regards to turn-taking, because when the lesson includes ICT, pupils do not want to share with their friends (Teacher4). Teacher5, however, claimed on the contrary that those pupils have problems in negotiation with their peers, but they can negotiate when it comes to using an iPad. Also, pupils with and without SEND do not discriminate against each other because they don't know the differences, said Teacher6.

> When they're in primary school, they tend not to differentiate between children who are different. (Teacher6)

In the questionnaire, parallel to the interviews, three of the teachers stated that they need to focus on what causes behavioural problems, and they see it as a symptom.

> Some pupils may demonstrate BP which are part of their SEND, however some pupils may demonstrate challenging behaviours that are unrelated to SEND and could be the result of social or emotional issues. (51-year-old female teacher from Devon)

SENCO5 stated that instead of focusing on pupils' special needs, they 'are looking at what the behaviour is telling us, so when there is a fight in the playground between two children, one of whom has autism, we'll try unpick what was the antecedence and what was the precedence'. They try to avoid these issues by finding out whether there has been any misunderstanding, because pupils with autism can 'misinterpret physical or verbal signals.'

Some teachers use the social story method, which is called 'comic strip' conversation in order to help the child learn from experience so that the next time they are in a challenging situation they can do things a bit differently, and it makes them think about their anger and reactions.

Disabilities are commonly understood as physical disabilities such as blindness or hearing loss, and 'learning difficulties would just come under SEN which means it could be something like dyslexia, ADHD, autism' (SENCO3). SEN is 'something delaying their learning and making it impossible for them to access the curriculum', but labels do not help all the time because there can be very broad definitions, as in the case of dyslexia, autism or ADHD. As can be seen, the participants in the questionnaire and interviews see behaviours as a symptom and aim to create an environment which will help reduce the issue, so instead of saying that pupils have dyslexia the teachers say that they have dyslexic tendencies.

5.1.1 Assessment

Assessments for behaviours are not formal; they come from the teacher's feedback, but if a pupil gets a diagnosis of autism, that comes from CAMHS (Child and Adolescent Mental Health Services, where pupils are referred to be assessed) or from a paediatrician, and they do lots of different tests in a clinic (SENCO1). If a school's SENCO sees signs of ADHD or autism, they refer the child to a paediatrician for a formal diagnosis. SENCOs cannot do a formal diagnosis, but if they see signs of a condition, they carry out interventions to support the pupil before the formal diagnosis is done (SENCO5). SENCO5 also said, 'Sometimes we think

we provide lots of evidence and they don't come back with the diagnosis. But we'll still carry on using the strategies by working with our educational psychologist, and she gives us advice and more strategies and again she helps us to identify what are the needs, not what are the problems.' SENCO4 also stated that they assess children with the teacher's assistance and address the issue by putting interventions in place, but if the pupil faces the same difficulties, they will include the school counsellor or educational psychologist to find out the reason for the misbehaviour or learning difficulties.

> With ADHD and autism, whichever learning differences they have is identified through a series of assessments. We can't say that a child is ADHD. We can say we suspect that a child is ADHD and, as a SENCO, my role will be to complete some forms, identify what we think the issues are, and then get them sent off to an external body. And they will assess the child. Usually it's someone like CAMHS or some mental health unit. (SENCO3)

Pupils are assessed continuously to make sure that they are supported and on track. The collaboration between the teacher and the SENCO is significant with regards to putting in place an education for every child based on their needs. Every pupil is assessed every term, with a half-term pupil progress meeting held to make sure every pupil with or without SEND is showing some progress (SENCO2). Monitoring and putting interventions in place is a part of this ongoing assessment.

5.1.2 The school's ethos

In the questionnaire, there was an open question about reflecting on the school's ethos, and the teachers generally stated that the typical school ethos is 'inclusion for all' and being 'totally inclusive - committed to getting to the root cause of behavioural problems' (54-year-old female teacher from London). They stated that the funding of SEND has been reduced by the government, therefore they struggle to provide the right education to pupils, and some participants said that they have found that one-to-one education is a more effective approach. More than 20 of the participants in

the questionnaire stated that differentiation of strategies is necessary because every child has unique needs. Also, they think that instead of a behaviourist approach a reflective approach is more inclusive, but this strategy is overwhelming and requires more staff (51-year-old female teacher from Essex).

> Work on a reflective approach and ask children to identify their actions, how it has affected others, and what action could they have taken. (50-year-old male teacher from London)

In the interviews, SENCO1 claimed that every child is treated the same in their school, and they consider the specific needs such as use of medicine and the condition of their special needs. The school is an inclusive environment that does not segregate but considers each child's specific needs and creates educational activities based on those needs (SENCO2). If a child has special needs, the teachers consider giving them exceptions, but also giving them awareness of the rules to improve their behaviour skills and self-regulating skills, as SENCO2 has behaviourist tendencies.

> This particular child that has autism needs to have regular movement breaks, so he knows he can get up every five minutes and go to drink water. He can play with his blue tank, he knows that he can go for a walk in the corridor (...) But he knows he can't call out, he knows he has to put his hand up, he knows he can't hurt someone. So those expectations are still in place. (SENCO2)

SENCO4 said that in their school behavioural problems are different from SEND, because pupils with behavioural problems 'know what is right and wrong'. Pupils with SEND, however, have behavioural exceptions because of their specific conditions, therefore in their school they approach the situation accordingly. For pupils with behavioural problems they control behaviours, and as SENCO4 said, 'I don't want to use the word control because it is not control, but how we use our behavioural policy to promote attainment and progress with the children. Special needs can be a cause of misbehaviour, but if we know that a particular child has a defined disorder, for example, then we kind of adapt our behavioural policy.' (SENCO4).

Teacher4 stated that they differentiate learning by considering pupils' special needs because 'one size doesn't fit all'. 'Inclusion for us means that we welcome all pupils at our school,' said SENCO2, but also, they have high expectations for every pupil. She said that their approach brings them success, as 'they were in the top in the borough for achievement and the top 1% of schools in England for maths'.

'There is a myriad of huge amounts of different labels, if you like, to put on child,' said SENCO3, but they 'would just say a behavioural need that severely impacted their ability to access the curriculum'. They do not use the language of blame and they do not focus on labels, but they focus on supporting pupils in the right way. They collaborate with all parties, and if they cannot manage behaviours through general strategies, they put in place special strategies based on pupils' needs. She also stated, 'We had children who in another school would have been excluded. But our ethos and policy are that every child needs to be able to access the learning. They all have the right to learn, no matter what their need is.' They have an inclusive ethos that is 'literally no child is left behind'. On the other hand, SENCO5 said that they 'don't classify behaviour as a problem' and 'try not to label too much', because it is all about understanding what behaviour is showing and why it happened. They are flexible, so they focus on the cause of behaviour (SENCO3).

5.2 ICT and behavioural problems

5.2.1 Difficulties when using ICT

Pupils with special needs might have difficulties in the classroom, and each SEND group has its own unique needs, therefore education needs to be flexible to meet those needs. A pupil with autism in the classroom of Teacher1, for example, has difficulties in getting on with other people, and generally prefers to work by herself because she's been so conscious of herself and her own learning needs. Therefore, when she is provided with an iPad to work on her own, she becomes more engaged in learning. This, however, may affect her engagement with her peers because, with the use of an iPad, she can easily isolate herself from the classroom environment,

but Teacher1 had fewer behavioural issues with this pupil. Having a routine is essential for special needs pupils, as she said that 'special needs children have a routine and if it hasn't been used before, trying to use it in a nice calming way, they don't want to because they have their routine' (Teacher1).

Teacher4 claimed that 'the children with behavioural problems tend to be the ones that are looking at inappropriate images or music because they're doing it at home, which all links back to their inappropriate behaviour'. She indicated that the teachers see this issue as a symptom of something happening at home, and they see it as a safeguarding issue.

> There are children who use the internet in inappropriate ways, and this is usually a symptom of other issues, (...) what's happening at home that makes them look at that? (Teacher4)

Teacher6 thinks that 'there aren't particular behaviours related to the use of ICT. It makes it a bit harder to manage because the more you're able to use ICT the more the children get used to it and the less exciting it is'. Teacher7 claimed that they used ICT to help a pupil with SEND with their handwriting, tracing letters, puzzles and memory games, but 'he did become dependent on it and didn't want to do it in his book. He only wanted to use the iPad'. She, therefore, used ICT as a reward to make him do other tasks. Teacher1 also faced some problems when she used ICT for teaching, especially when pupils need to use a device together. They could not collaborate and interact with each other because they did not want to share the device.

> I would say that the biggest issue I've ever faced has been trying to get them to interact with each other using ICT. Actually, where kids haven't had access to ICT, when they do have it, they become like super possessive. (Teacher1)

Teacher1 also stated that when she has used videos for teaching, pupils have switched off and stopped paying attention. Her statement is in line with Teacher4's statement that pupils with behavioural problems have freedom to use ICT at home,

and they do not want to use it for educational purposes. Pupils with behavioural problems generally have ‘a lot of freedom back home, and they are the ones that tend to have a lot of ICT and technology independence at home’ (Teacher1). Pupils see ICT as something related to leisure time and entertainment, claimed Teacher1, and it causes problems when they use it for educational purposes. Teacher6 argued that to reduce the impact of over excitement, new technology such as virtual reality needs to be used.

5.2.2 Off-task behaviours

Off-task behaviours during ICT-based activities are affecting teaching, and teachers always feel the need to monitor pupils continuously. For example, the teachers who participated in the questionnaire stated that ‘if searching for images children can easily get off track, also they can spend ages playing around with fonts instead of getting any work done if it's a written task’ (45-year-old male teacher from North West of England).

Teacher3, therefore, argued that simply giving ICT to pupils with SEND is not supporting them, the aim is to just keep them quiet. Teacher5 stated that pupils ‘are now so good at the app, using the iPad, they could really hide anything from us, so it’s increased our job monumentally because we need to keep an eye on them’. Teacher3 argued that the focus should be on learning rather than using ICT to keep them quiet, and pupils will follow the teacher’s strategy if the teacher finds a way to deal with behavioural problems. The teachers who participated in the questionnaire also argued that their job is teaching rather than making pupils happy.

> I have noticed that some children with behavioural problems have been given laptops; maybe it is a treat or as a way to keep them quiet, and I don’t necessarily agree with that. (Teacher3)

The Year 5 and Year 6 teachers said that they have issues with pupils’ use of messaging apps and their comments on social media. The issues that stem from

those platforms are transferred to the school, ‘they are saying things that are not very nice to each other’, and they are bullying each other online via anonymous accounts (Teacher6). Teacher6 said that bullying is getting worse with pupils’ access to the online world. Teacher5 stated that he hears that they discuss what they have said to each other online or via messaging, but he observed that they act differently in the classroom, and they are careful in front of their teacher.

> When I was young, bullying was physical abuses. (...) If you got bullied, people could see you’re being bullied, whereas on the internet and mobile phones you can read a text message and then no one can see what is going on, and it’s all mental bullying, and that to me is so much worse than physical bullying, even though physical bullying is awful. (Teacher6)

Pupils have social media accounts and access to inappropriate things online. When they use iPads in the classroom, they might end up doing something else which is inappropriate. They do ‘silly Google searches’ and show things to each other that they have found on the internet. Teacher5 thought that pupils’ behaviours are getting better when they use iPads for teaching and learning, but when they are online, they display off-task behaviours. ‘Some children we wouldn’t normally perceive as naughty children are being naughty in certain ways on the internet,’ when they are using certain apps. Also, SENCO3 argued that during a task you could end up in a situation where the pupils ‘all are on YouTube. They’re all on the wrong thing’.

> And that’s another thing that I told you about, censoring some of the apps (...) It’s very difficult for a teacher to manage internet safety. That’s why it’s really vital for us to teach them how to be safe on the internet and how to use it appropriately. (Teacher5)

5.2.3 Intervention

Pupils with behavioural problems were taken to the headteacher when they show challenging behaviours, and the school comes up with a strategy of writing targets for them, which include ‘we’ll listen on the carpet, we’ll talk appropriately to adults,

we'll respond to peers in the correct way' (SENCO1). Parents were also being involved in this by being informed about what happens at schools and the targets that are being set for their children. The headteacher also had a therapy dog for pupils who are misbehaving, they were taken to the headteacher's room and the dog calms them down. They talked the issue 'through and tell them what they should have been doing rather than sort of escalating the situation' (SENCO1). Social stories are also being used to teach pupils how to behave and react in certain situations, and how to have a good relationship with their friends. In case of anger management issues, these pupils are calmed down with particular songs and videos. In the questionnaire, ICT was seen as an intervention tool for pupils with challenging behaviours.

Motivating pupils can help to reduce challenging behaviours, so teachers use the playground as a motivating tool to make pupils change their behaviour. They use behavioural charts to clarify appropriate behaviours, and they give the pupils stickers when they display these behaviours (SENCO1). 'We use different behavioural charts. So, it could be a whole class chart or one for an individual child where they earn points and then get a reward at the end, and it is motivating.' (SENCO1).

SENCO1 stated that instead of shouting at pupils with behavioural problems or taking things away from them, they 'try to distract the children rather than disciplining them'. They 'put more resources out there for children to be occupied and they've reduced the number of incidents' (SENCO2). If pupils' behavioural problems are very specific and the software intervention has not worked, the teachers change their strategy. If group work for social skills interventions does not work, the teachers change their strategy rather than blaming the pupil's special condition, as SENCO2 stated. There is an ongoing assessment of educational strategies to make sure that the right intervention is put in place. SENCO2 said that those barriers have an impact on learning, so removing them increases access to learning.

> If you had a child who wasn't able to work within a group, we have social skills interventions so that child would have been identified as having difficulty working within a group. (SENCO2)

The teachers and SENCOs commonly stated that if education is planned well and pupils are occupied all the time, it reduces misbehaviour. Therefore, Teacher4 stated that the opportunities that are provided with iPads help pupils with sight issues, for example, to adjust things for themselves, and when their needs are met, they do not misbehave. In their school, SENCO4 said that they have a behavioural strategy, so that when a pupil misbehaves and repeats the misbehaviour, SENCO4 would intervene and remind them of the school's expectations. They used a reflection strategy for pupils who are close to being detained, and when pupils reflect on their behaviour and its consequences, it improves their understanding and they would stop doing it.

> They have ten minutes to kind of reflect on their behaviour (...) Scenario: we ask the child to put himself in a scenario where someone is being mean to them, how they will react like that. (SENCO4)

Finding relevant interventions and customising them is a major issue for SENCOs, and they use online resources as well as their knowledge to find the most appropriate intervention for each pupil's specific needs.

> EEF (Education Endowment Foundation) are much better now at being able to independently review interventions, so that's a good place to turn to, to see if a particular intervention actually has some credibility, does it have reliability. (SENCO5)

5.2.4 Personalisation and Differentiation

Personalisation and differentiation are among the essential parts of ICT for pupils with SEND, and the participants commonly indicated that ICT is supportive for their education in that sense. Teachers need to change their teaching when it does not

work for a child, as SENCO1 stated in cases when it is difficult for their level. A teacher can tailor a video based on each pupil's needs, and all the time the focus is on those needs to make sure that the teaching fits with the needs of those pupils with SEND. A teacher, for example, can use a visualiser for a child to communicate his or her ideas, if they cannot communicate verbally or in writing. Bite-size learning helps to personalise the learning based on each pupil's needs, and give a sense of achievement to encourage pupils to continue to the next step. SENCO4's school used London Grid for Learning (LGFL) resources to personalise learning with the help of ICT. Finding appropriate and supportive resources for the needs of pupils is an issue for schools, and they use online platforms for teaching.

One size does not fit all. For example, one pupil was struggling with handwriting, so they provided an iPad with a Bluetooth keyboard and this pupil became engaged in education (SENCO5). So, for example, dyslexic children can find it much easier just to type the correct spelling, and they'll be more willing to have a go with spelling using the computer (SENCO5).

Teacher1 stated that with a student-centred approach, they focus on the aspects of teaching essential for their future, such as collaboration and interaction with their peers. Each country has specific requirements for education to thrive in the future, so it needs to reflect the social life of the country.

A student-centred approach can be applied with online quizzes and visuals that provide different examples for different learners (Teacher2). Online learning platforms also provide instant feedback which can be used to follow up on whether pupils are learning or not. Teacher4 said they analysed the outcomes weekly and they become aware of who was learning and who was struggling. Then, for pupils who were struggling, they provided additional support in the following week with a Teaching Assistant (TA) to close the gap.

> I think we use a system called 'assertive mentoring', (…) so that I can go over there and support that child in the section that they are struggling with. (Teacher4)

ICT helps to differentiate learning with a need-sensitive approach and playable digital devices. Some pupils have access to these devices, and some do not, therefore it creates a gap in education. The participants in the questionnaire and interviews discussed how giving every pupil in the country a device would remove this gap, and every pupil would have the opportunity to learn.

> Giving every child an iPad in the country is an opportunity to make a level platform for everyone in the country. (Teacher5)

Differentiation can help pupils learn, and 'it helps with their self-esteem' (SENCO1). Differentiation can be achieved in various ways; for example, 'if the result is to write a story, they might act out the story or they might tell the story instead of having to write it down' (SENCO1). A teacher can ask different questions of different pupils with regard to the same topic to create a link between each pupil's learning and the subject, because there are different types of learners (visual, practical, and one-to-one).

Teacher2 stated that they needed to scaffold learning based on the needs of pupils, and each pupil would have different steps for their teaching. If pupils could see their steps of learning and see their progress, it would give them a sense of achievement and learning (Teacher7). For different learners, extra resourcing is essential to creating a link, and this can be achieved by breaking down the steps and supporting the pupils with extra visual and physical resources (SENCO3).

> I don't see the platforms as something that you give to the children who are going to get on with it and learn. I see a tool for teachers to scaffold their learning at particular steps. (Teacher2)

5.2.5 Supporting

An individual educational plan (IEP) includes targets for pupils with SEND, and it allows teachers and SENCOs to follow whether pupils are learning. An IEP is the result of meetings with the SENCO and the teacher, and if an educational

psychologist was needed, they were also involved. They shared ideas and coordinated to have consistency when supporting the pupil (SENCO1). If an educational health social care needs plan (EHS) is done and it is identified that a pupil's need is quite significant, and they need extra support, then funding will be put in place for a TA to support them one-to-one in class (SENCO3). However, SENCO3 indicated that getting funding from local authorities was very difficult, and they still employed an individualised plan if they could not get funds.

There are different supporting strategies, for example, 'Word Shark' for spelling and 'Number Shark' for numbers, which are 'very short interventions on a daily basis', and 'the child doesn't realise he or she is learning within a game' (SENCO2). They learn with games when they use these programs, but also their surroundings and condition may affect their learning. Teachers, therefore, need to consider whether pupils need a break if the lesson is overwhelming for them, or whether their desk should be adjusted based on their needs, or if they might have problems with their pens while they are writing (SENCO2). For example, SENCO4 discussed a pupil with autism who did not like the way he writes, would have a meltdown if his handwriting was not perfect, so they had used word processing so that at least the pupil knows that whatever he was typing will come out very neat, and then they printed it off and then they glued it into their book (SENCO4).

One-to-one support is really supportive for pupils with SEND, as SENCO3 said that she had a pupil with extreme behavioural needs without TA support, and it was very difficult, but the year after, they could support him by providing a TA. They did not exclude him, and 'nobody shouted at him and management made sure that everybody was aware of that and these children are managed very carefully' (SENCO3). The SENCOs said that they constantly assess their approach and whether it is working or not, and they discuss with teachers the issues and the ways in which they implement teaching and behavioural strategies. They also sign a behavioural contract with the pupil, and when the student breaches the behaviour contract, they are reminded of their contract.

Some of the participants use iPads as motivation for pupils with autism; however, pupils with ADHD and autism are very possessive over the use of iPads, and so it creates problems and reduces the chance of collaboration with their peers, thus it needs to be carefully managed to build positive relationships between peers (SENCO3).

> We've got a little partition board to help them concentrate. They might sit at their own table for a short amount of the lesson and they might have a wobble cushion. They get movement breaks. And we often find that there are sensory behaviours for both autism and ADHD. (SENCO5)

Teacher1 used an iPad for a pupil who did not want to be part of the lesson, so she recorded herself teaching the lesson on the app by designing the lesson as a one-to-one lesson with clear steps. The pupils worked with the TA and she said that his experience was very positive. The lesson was tailored based on his needs, and he had the experience of having a teacher for himself, and he said, 'Oh miss, it was so cool.'

ICT engages pupils with SEND because it provides apps that they need for learning; for example, filming what they have done to practice later. They can manipulate visuals on an iPad, which creates opportunities to do different things (Teacher5). Teacher5 also said that they 'had some children who had issues with eyesight in our year and they used a specific piece of technology which helped them to zoom in and zoom out on certain things' (Teacher5). They used 'Mathletics and Maths Lab', which included games for learning, and they are competitive games which engage pupils because they want to beat their friends. 'Interactive learning like touch typing games, spelling games, phonic games, easy maths games and pupils like to find pictures on the internet and sort of add captions.' (Teacher6). Teacher7 stated that they used 'Spellodrome' for literacy, and 'Purple Mash' for reading activities. 'Videos are there to enhance teacher and learning,' said Teacher6. For example, in science they used simulations to enhance learning when they did not have the opportunity to test it in

the real world. Examples of these types of support were frequently mentioned by the participants in the questionnaire, so using these apps is common practice.

5.3 Affordances of ICT

5.3.1 Easiness

When it comes to technology, for the participants it makes things easier (SENCO5). Technological tools are handy and easy to work with for pupils and for teachers (Teacher7 and Teacher2). The participants in the questionnaire also said that ICT makes things easier.

> It does make life easier as a teacher to use it and as long as you use it correctly, I think it really helps. (Teacher3)

Technology, especially portable tools, makes some tasks very easy, and taking photos and editing them is easier with tablets compared to previous technologies (SENCO1). Content manipulation is key for creating educational tasks. A task that requires speciality knowledge can now be performed by early year pupils. 'Pupils just find it really easy, whereas previously taking the photo, uploading it to a computer then uploading some software, you know, it was more difficult.' (SENCO1).

For one participant, another sign of ease was the safety factor, because some websites are created for educational purposes and they are age appropriate.

> You're using a program like Espresso; it's easier because you know that everything is safe. (SENCO1)

Tablets and computers allow typing for early age pupils, and it is easier to navigate around writing when pupils can recognise letters. Touch-typing is preferable for pupils, because they use their fingers. It makes things easier for teachers, as they need less space for books when they are stored digitally. As one participant stated, 'We needed less space for storing books.' (Teacher4).

5.3.2 Feeling

There are emotional affordances of technology, and certain feelings are associated with specific technological features. Pupils like to be seen on the screen, and schools make use of this feeling to create a sense of belonging to the school. A climate is created, and children can relate to the feeling of being on the screen or the internet. However, it can be additional work for schools to put pupils on a screen. 'I think in today's climate, it is essential. Children relate to that.' (SENCO2).

> We have a school Facebook page. We put pictures of one particular class, and all the other parents would then be asking for their children's faces and their artwork. (SENCO1)

According to one teacher these devices make people feel modern, and the newness of these devices supports this feeling. These feelings make pupils love them and be keen to use them. Teacher1 also stated that pupils associate the feeling of innovation with technological devices, so they like to possess the devices.

> We've got to motivate the disaffected somehow. And they do like using kindles (...) It felt very modern and new. (Teacher4)

5.3.3 Flexibility

Technology creates the flexibility to access things and revisit them when they are available. This is the flexibility of space for interaction, so the person does not need to be in the same place. People prefer to access things wherever and whenever they want, so this flexibility increases access and collaboration (Teacher4). They use their time to access the files of pupils and work on strategies. Technology creates the flexibility of being present if not in body, then as a voice.

> What I've done a few times again, I remember once or twice I lost my voice, so I physically couldn't talk in the lessons, so I had my sister at home record the questions I wanted to ask and I put the questions on there. (Teacher1)

It brings the flexibility to the classroom to find things, bring new resources or even change the plan if necessary. The participants in the interviews claimed that this flexibility makes things easier, but in the questionnaires, flexibility was not mentioned.

> You should be flexible to be able to find things that help you on the spot, sometimes because you can't always think of everything four days before when you're planning it. (Teacher6)

5.3.4 Interaction

Interaction is at the centre of the internet; educators are looking for interactive activities to make pupils more active and create collaborative activities. The participants said that they believe that ICT-based activities are more interactive due to the interactive nature of the internet and digital devices (SENCO1). In the questionnaire, more than ten of the teachers stated that ICT increases interaction. When a lesson is interactive, pupils are more willing to be involved because in those lessons they have tasks to do on computers. According to Teacher1, pupils are more engaged and stay on-task. They love the interactivity of the internet, and teachers use it in the classroom as well as for homework (Teacher4).

> Interaction wise, they tend to talk a lot among themselves a lot of the time. (...) So, generally they interact more, they tend to ask more questions. (Teacher1)

Educational applications are used to promote interactivity so that children interact with each other by sharing their work through applications with the classroom or with the wider community of education. One example of this is an app called 'Showbie', which helps create interaction in the classroom.

> The interactivity is when they make something on keynote or explain everything and then they all share that on the Apple TV. (...) They are designing something or drawing something, and they want to use the 'Showbie' account to post something on there. (Teacher5)

Educational games are also used for interactivity, and they are among the favourite ways for teachers to engage students through interactivity. Interactive stories are used by teachers, and Teacher6 stated that they engage pupils and create interaction through these stories. They do Google searches to find resources; for example, 'there was a really nice link that came up and it was almost like an interactive story. You had one of the characters talking from the Great Fire of London saying, 'Oh, this happened to me today and I had to call my dad. Can you help me choose three items to take with me, so it doesn't get burned in the fire?'

> We can't recreate the fire for them to understand it. So, it's really good for them almost interacting with the child from the time being in the Great Fire of London; he was interacting with us, (...) and they really like it, like saying, 'Oh, we can help you; we can help you.' (Teacher6)

5.3.5 Competition

Competition and instant reward keep pupils engaged with the combination of visuals and things that are moving, according to the participants. When the game is competitive, they are tuned in to the activity and learning takes place, and the teachers said that this is why pupils like games and enjoy playing them (Teacher3 and SENCO1). As Teacher4 said, 'The children adore Mathletics because it's competitive.' Therefore, when the educational activity is competitive, it reduces behavioural problems because the pupils are engaged in the activity and they focus on the game.

> They love it, they love being in a competition because when they're competitive it takes their mind off them being naughty. (...) They are engaged with the competition and what they're doing. (Teacher5)

Mathletics provides competitive games for those children with behavioural problems, and maths is not a boring subject for them anymore. They love to play and beat their friends. Teacher5 observed that they are very keen to play maths games, and maths is not a subject that is associated with being boring.

> Children really feel engaged and they want to beat their friends. So, it's a different motivation and it doesn't make maths seem boring. (Teacher5)

This competition can make pupils selfish, because the game will be 'just about their short term winning and then gaining something', said Teacher3. They like to see who is winning and getting to the next level, and technology provides real-time outcomes for competitive people (Teacher7).

5.3.6 Speed

There was a very common message that resonated among the teachers, which is that 'with the ICT you can do that quicker' (Teacher2), and the participants stated that speed is equal to effectiveness, as they do spend less time on preparing things. If it is fast, it is effective; as Teacher2 stated, 'It is quicker and more effective.' It is believed that it is not just the speed of moving things, it is the speed of gaining knowledge, learning and researching. The internet is a fantastic resource, because knowledge is at the user's fingertips, so pupils can reach this knowledge in seconds (Teacher2).

> It is very quick, it is a very effective, very visual method, and children engage and understand that. They know they can research. Knowledge is at their fingertips, so you've got rich resources at the touch of a button. (SENCO2)

According to SENCO1, with technology educators communicate faster and access resources faster, because it makes things more flexible with that speed. It is just not the speed of access; it also allows users to share things quickly, and this speed enhances collaboration (Teacher2). Its speed can also be arranged based on the needs of the learner. Two of the participants in the questionnaire also claimed that, with ICT, finding and creating resources is faster and it increases productivity.

> It'll be probably easier for a child to learn at their own pace rather than the pace that I set for them. (Teacher7)

5.3.7 Time

By making things faster and easier, it saves a lot of time for teachers and SENCOs. There is a new concept of time for the age of the internet, and it is now and instant. As SENCO1 stated, 'I think because everybody wants everything now. You want that instant gratification; you want to know everything to do everything in that second.' The time for the digital age is fast, flexible, interactive and now, so as Teacher3 stated, 'Without the ICT you will find that you're describing things for longer. Your input will go on for longer. They spend less time on finding resources because there is a program or a website where it's already done it for you.' (SENCO1).

On the internet, all resources are available, and they are waiting to be found by teachers. When Teacher1 compared her early career days, in the pre-digitised age, she believed that not having resources ready caused her to lose the potential for enhancing pupils' learning. In the questionnaire, many teachers claimed that because of the time issue, they could not improve their practice and follow research and changes in the field. Moreover, they said that they think that ICT saves time, so the time that is being saved by the use of technology can be used to personalise learning. Things need to be fast, so that 'the children can do their independent learning' (Teacher3).

> It saves time in my planning, organising and resourcing. (Teacher1)

5.4 Education in the technological era

5.4.1 The ongoing development of ICT

'Technology is developing all the time,' (SENCO1) therefore, teachers 'need to keep learning to learn how things might work effectively for [them] in certain situations' (Teacher7). There is a need for teachers to improve their skills and knowledge of ICT continuously for education as well as for life. The ongoing development of ICT has made teachers feel that they are falling behind and cannot keep up with the pace;

therefore, professional development courses that are focused on educational technologies are being demanded by teachers (Teacher1). They need to update themselves with information about the newly arrived applications and websites, so there is a race to keep pace with the changes.

> We use it so much and it's becoming such an important part in so many fields that, like, if you don't have any knowledge of it, you're gonna fall behind. (Teacher1)

Although some participants stated that they cannot keep pace with developments, Teacher7 was 'kind of surprised it didn't get here quicker, I thought it would have happened sooner.' This can be understood from the idea of being replaced by a robot; teachers have different feelings towards development, and they develop their sense of technology based on new advancements. They think that in the current atmosphere realities and expectations are different, as some schools cannot afford iPads for their students, but at the same time there is a fear of being replaced by robots.

> It will be ridiculous to have a robot teacher which will cost millions of pounds, and every school is in deficit. As I said, we have got two sets of iPads, which I know other schools in the Borough do not have, they are not lucky enough. (...) So, we do embrace some of the new technology which suits the school… (Teacher6)

5.4.2 Lack of support and understanding

The participants in the questionnaire were asked whether educational practice which involves technology is evidence-based; nine of the teachers claimed that it is not evidence-based, and three of them claimed that they adopt changes slowly. This is due to limited budget, time and experience, as eight of the participants argued. A 35-year-old female teacher from Devon claimed that instead of reading a long research paper, she would search for things that require less time and would have an immediate impact. A 45 year old male teacher from North West of England claimed that even doctorate students do not have the slightest idea about educational

research, because they are not critical of things that they are told by experts, and teachers are forced by their headteachers to do things that will please OFSTED. Around ten of the teachers claimed that they follow evidence-based research, and the ICT coordinator informs these teachers about any newly researched ideas. Moreover, there were more than 20 teachers who responded as 'unsure', so teachers need support to integrate evidence-based use of ICT.

Teacher3 claimed that some schools do not care about integrating ICT, and ongoing training is needed because it is difficult to keep up with the pace of changes. Teacher3 thought that because they focus on exams and the end result too much, using ICT is not of concern. They do not have time to focus on certain lessons and how to teach them effectively; therefore, some subjects are not a priority for some schools.

> I don't think I integrate as much as I could. I would like to use it even more. I think that the pressure in the education system, it is all about the targets, it's all about tests. (Teacher3)

Teacher4 thought that ICT can be used more effectively, but there is a lack of support, training and understanding. Teachers should invest more time in learning how to integrate it in their teaching effectively. Teachers need more training on how to integrate ICT to be able to go beyond teaching basic IT skills and making pupils use it effectively in their lives, because 'for some people ICT is making a Microsoft PowerPoint and typing up some work' (Teacher7). On the other hand, financial and technical problems are very common, such that they cannot hire enough people for technical support, as well as the fact that they cannot buy the state of art technology to support their teaching. New devices are expensive, and there are financial constraints when it comes to bringing new devices in (Teacher7).

> I don't think that most schools make enough use of ICT. I think many teachers are scared of using ICT in their classroom and they haven't got time to learn it properly. There are also the financial constraints; my school laptop is older than the children I teach. (...) Promethean did these wonderful white board utilities

> where you have a voting box, but I worked at a school that was an IT lead school, and we only had enough money to buy 15 voting boxes. It is useless, as everybody has to have one. (Teacher4)

When technology companies develop a new product, they do not think about the needs of schools, they just have an idea that developing something would benefit schools and they work on it rather than first asking educators about what would be supportive in their classrooms. Teacher4 stated that a lack of understanding of the educational needs of schools affects the outcomes, and the solutions that these firms bring do not have a real-life connection. She listed the websites and apps that meet her needs and support her teaching.

> It tends to be the smaller companies, smaller organisations where it's been some teachers. There seem to be the most effective. 'Mathletics', highly effective. 'Reach Out' and 'Tigtag' are highly effective. The BBC stuff because they have a whole huge department which is only education, highly effective. Giants like IBM, Apple have produced truly awful stuff for primary school. Then you go to people like the Microsoft education department and I don't think they've ever met a child. (Teacher4)

Integration is more than saying, 'This is our PowerPoint, and this is what we're going to learn today from the PowerPoint.' (Teacher7). Another problem is that there were some pupils who do not have resources at home, so teachers allowed them some time to use the schools' iPads to be able to do their computer-based homework. Teacher5 provided opportunities for pupils who did not have access to technological devices and were not able to do their computer-based homework. This might be the reason why some of the teachers who participated in the questionnaire stated that they did not give ICT-based homework.

5.4.3 Reliance on ICT

Technology has become a very essential part of education. As SENCO3 stated, 'Most teachers are dependent on it. Most teachers wouldn't teach a lesson without

doing some kind of electronic presentation part of their lesson.' With this ubiquitous technology, teachers are reliant on ICT, but they still experience break-downs which affect their teaching. SENCO4 therefore stated, 'If we don't have access to computers one day because the electricity is off, we need to be able to kind of use other skills so that the learning can continue.'

> I think most teachers will say it is very hard to teach a lesson without doing a PowerPoint or some kind of visual presentation to work through. (SENCO3)

Teacher1 argued that some teachers barely used it to support their teaching, and 'they used it at a basic level', but the new curriculum had changed and now pushes schools to use it more and teach the basics of programming. The infrastructure of some schools is still very old, and although devices have been improved, they still use old computers. They are reliant on ICT, but they have to use it for presentations (Teacher1; Teacher4). Teacher1 and Teacher4 said that they thought it was a very intricate part of life that is being used everywhere, from navigating to communicating, and from seeking knowledge to enjoying entertainment. It therefore should be used more, and teachers will struggle to connect learning to real-life without being very ICT-based.

> I hope that there is more ICT, just because I think it's such an intricate part in so many areas of life that if you don't know how to use ICT, you will struggle. (Teacher1)

Without ICT, it will be very difficult for schools to teach effectively, and it is very easy and cheap to find resources on the internet (Teacher3). Teacher3 also reported that it was hard working without a whiteboard for a couple of months.

> It is a resource that's very cheap; even if you subscribe to online teaching things, that's quite cheap as well. It's just quicker and easier, and if we didn't have that we would have to go back and buy so many resources, and schools don't have the money or the space. (Teacher3)

Without the internet and computers teachers will face difficulties in teaching, as teachers are very used to teaching with digital devices (Teacher3 and Teacher4). Especially, younger teachers are more reliant on ICT and they cannot imagine teaching without ICT, and the dependency is increasing. Teacher4 claimed that younger teachers struggled to teach without ICT.

> I wouldn't be able to teach without my internet resources and without 'Explain Everything', and without my YouTube links and without my internet links as well. (Teacher5)

Teacher7 thought it has made some teachers lazy, but that may be down to the lack of resources and lack of money. However, SENCO1 stated that using it too much will affect the use of certain skills such as memory, because we 'don't have to remember things, you can just google things', and map reading skills, as we use navigation. Administration is also heavily reliant on ICT in schools, and it is increasingly applied in communication, assessment and finding resources (Teacher1). It helps teachers communicate with parents easily, and connects the home to the school with internet-based homework (Teacher3).

Teacher3, however, thought that the future will be more ICT-based. She said, 'I do sometimes think that some schools, all the children have an iPad, everything is online. Is that really necessary?' In the questionnaire there was a question which invited teachers to reflect on how their role has changed with the increasing impact of technology. The teachers who participated in the questionnaire and those who were interviewed both said that they believe that technology makes pupils more independent, so teachers are just a channel into resources. Pupils facilitate their own learning, and the teacher is there to facilitate learning through technological means.

In the questionnaire, one participant claimed that they are more dependent on ICT, and it is more challenging as they have to follow changes. As mentioned above, there is ongoing development in this field. Another participant in the questionnaire claimed that there was more pressure to keep up to date. However, two of the teachers stated that they are aware of the dilemma that they feel under pressure,

and at the same time they believe it makes things easier (31-year-old female teacher from Dorset), and they are more dependent on it but this is fine, because this is how the world is (35-year-old male teacher from Essex). Teacher2 also described the dilemma wherein he saw himself as a facilitator, but he also thought that if the internet is down, he will be able to teach using traditional methods.

> I feel as though children can become more independent and less reliant on my resourcing, explanations, etc., as they can access high-level information online. (27-year-old male teacher from London)

5.4.4 ICT and the future

Teacher7 thinks that technology has its purpose, but she also thinks that at the moment not everyone is educated to the extent that they understand how they can use it effectively. Therefore, she claimed that they need to use more ICT to achieve effective teaching. Primary schools do not keep pace with the technologised world when compared with secondary schools, colleges and universities; therefore, there is a need for more ICT in primary schools to create real-life connections. This would make lessons more practical, and it can be achieved by using more ICT (Teacher3).

Teacher4 stated that old technology should be replaced with new technology to keep pace with ongoing developments. The old habits of equalising ICT with copy and paste should also be replaced, as pupils are required to be more efficient in using ICT.

> Quite often teachers think that ICT is just about whether a child can copy and paste something or whether they can type correctly on a computer, and this is not what it is about. They need to now be able to use an iPad to be able to be a working human being and actually get good employment. (Teacher5)

All of the participants in the study were somehow in agreement with the idea that ‘in the future, already now, everything is done through ICT, but in the future, it will be

more' (SENCO2). It has become an intricate part of every job, and in the less industrialised countries the role of ICT is different as life is different (Teacher1).

Education should transform itself when it is needed, and Teacher1 stated that in different countries with different needs, education focuses on teaching accordingly. Teacher4, therefore, stated that if pupils are not going to use books in the future, they need to be taught with digital book readers. The need identifies what to teach and how to teach, as Teacher4 also stated that with pupils who cannot write, there should be voice recognition technology in schools to help them write. If the future is the internet, then pupils need to learn how to use it to improve their skills, therefore, it is not effective to assess pupils during exams by prohibiting the use of the internet, she said. The thinking and learning of how to use the internet are significant, and education needs to be structured accordingly.

> I think more and more we'll become reliant on technology. If you look at the Norwegian model for example, for their A level exams, they're allowed to have tablets because the exam isn't testing what they've learned off by heart, it's testing their thinking. (Teacher4)

The teachers commonly argued that there should be a connection between schools and life; therefore, pupils should be taught the skills they will need in the future (Teacher5). More than 20 of the teachers who participated in the questionnaire also suggested that to make pupils ready for the future, ICT should be used effectively. Especially, if pupils do not have the opportunity to learn how to use technology at home, school is the place to teach them those skills. Media literacy is important, and children need to know when it's appropriate to say or do a particular thing or to go to a particular place (Teacher5).

The question of what the future of education will be like raises a question which has been asked for a very long time, which is whether teachers will be replaced by robots. Therefore, when the teachers were asked about the future of education, they were reminded of this issue. For example, Teacher6 said that a teacher is someone who informs pupils in a video mode; therefore, if robots project videos, teachers will

be replaced. However, she also thinks that some things 'cannot be taught from a robot on a laptop', such as value.

> I am sure all teachers will be replaced by robots. I know they can project videos. If they can project videos, I want one. I think human teachers will be around for a long time, but they might start to bring in robots for certain academia like higher academics, where there is lots of research-based things to do and you can ask specific questions, and then the robot will go straight to the internet and give the exact answer, rather than a teacher. In primary, they definitely need nurturing. So, a robot can't do the nurturing. (Teacher6)

The world is changing in such a way that the connection between people is disappearing (Teacher2). Technology will not help create this connection between people; therefore, the solution is not more ICT for some teachers. It is not only about learning things. 'I think that schools will be a place, I would hope, they will be places where humans can still interact with each other and build those kinds of connections, because otherwise everybody is going to be disconnected, so schools will facilitate that need' (Teacher2).

5.4.5 ICT and Safety

Online safety is one of the common issues with which education has to deal, and teachers have to filter effectively to be able to keep their students safe from online harm and misinformation. They need to be very careful when searching online, because they can put something completely innocent into Google, and all kinds of pictures will come upon the screen (SENCO1). In the questionnaire, more than 15 of the teachers stated that online safety is an issue and online safety education, which is covered in media literacy, should be integrated effectively.

> You have to be quite nervous of allowing the children to access online resources themselves, because even with heavy filters in place you can still get inappropriate content. (SENCO3)

Schools have filters to keep pupils safe online, and all websites encountered with bad information are blocked. They filter videos as well to make sure they are appropriate for learning, and they use a website which is called 'Access YouTube' to filter adverts. Teacher5 said that they were using an app that monitors pupils' devices, and he thought that inappropriate use makes their job more difficult, but with these monitoring apps teachers can control how pupils use their iPads.

> It is also important to promote those skills in students to know what is right and what is wrong. So, when they encounter the bad information, they are the first one to say, 'No, I don't want to read this.' It is all down to us to keep the child safe and promote independent learners that are able to identify what is right what is wrong. (SENCO4)

Teachers perform the role of gatekeeper to keep children safe from misinformation and online harm. Teacher4 warned that she would never show a clip that she has not watched herself, and she would never actively search for something in front of the children. Also, she claimed that younger teachers struggle to use it appropriately because they do not approach the situation cautiously when they do internet searches in front of pupils, or when they use a video clip from the internet. Videos should be reviewed first to make sure that they are completely safe (SENCO1).

Pupils need to learn to appreciate the intentions of things that appear online. It is like going to a supermarket and deciding to buy what is good for you, but you can be tempted by everything on the shelves, so it is an ongoing negotiation of what to do. Pupils need to learn what is good and what is bad for them, because they spend too much time online and they spend this time by themselves (SENCO4). Pupils do not use the internet safely and appropriately outside of school. Teacher5 claimed, therefore, that they search the internet in front of pupils to provide a model for pupils in order to improve their understanding of online safety and reliable information.

> Well, it is a business, isn't it? It is a business, and it's just like adverts for television. We need to teach everybody to be knowledgeable about what's happening. (SENCO5)

However, Teacher1 criticised the idea of not accepting everything you read online, because she thinks there is plenty of accurate online information. She stated that pupils need to be critical when they encounter online information and they need to decide what is accurate and what is not. Teacher7 said, 'However, though, with the advancement of technology in the world around pupils, it's not necessarily a bad thing, we just have to educate them how to use it properly and not just saying like, 'Oh, you're too young to look at this,' but to understand the dangers around it.' Using online resources critically is essential in terms of making children independent learners, because the internet is the main resource in education (Teacher1). A 54-year-old female participant from Devon suggested giving pupils the role of 'digital leader' with regards to online safety training, to guide and protect themselves and others.

However, it is commonly stated that the content of apps is the biggest issue in schools, because if the content is not related or is not good enough or is dangerous somehow, it can be a very negative tool for schools. Therefore, they trial apps to see whether they will work for them or be helpful in the support of pupils' learning. The main content issue is with YouTube, because of the availability of inappropriate content, and pupils use this website very commonly. Although YouTube has developed a specific app for children, a teacher might use another version for the classroom, and without regulation these problems will continue.

> I don't think YouTube is necessarily as strict as it should be. So, I think in some schools, YouTube has been banned, and we're coming very close to banning it. (...) I think YouTube should have stricter codes about certain videos that children are allowed to watch, and I think YouTube should develop themselves their apps to make a classroom-based app for YouTube. (Teacher5)

The internet is full of opportunities to use it for different things, but at the same time it is full of dangers, because when it brings access to everything, it brings access to pupils as well. While they can find interesting things on the internet, at the same time they are exposed to dangerous and inappropriate things (Teacher5). Teachers,

therefore, struggle to make meaning of the role of the internet for their job. Pupils 'have an opportunity to get access to things that they never ever would be able to access before, and it makes it very dangerous. So, they will be bullying other people but also people will be contacting them' (Teacher5).

For Teacher3, technology overuse is a very worrying issue, and she thinks that pupils are glued to their phones and they are on their phones in their bedrooms all the time. 'I worry that future children are gonna be even more addicted to technology outside of school, and that could bring problems into school. They can't bear to be away from their phones already.' She observed over a period of time that when pupils started to have their own phones, problems such as overuse, online safety and bullying started. She claimed that in secondary school the problem was even worse.

> They have the internet, but they're not concerned about anything else apart from their own little bubble of their friends. They don't care about what's happening on the other side of the world. (Teacher3)

At the start of the year, Teacher7's school introduced a lesson about online safety and bullying to keep pupils safe online. Another school has workshops for parents to inform them about online safety and how to help their kids be safe online and also monitor their internet use.

> We do a lot of workshops and we invite the parents to come in so that we can kind of share our view of what is safe and what is not safe. (SENCO4)

5.4.6 Social media and connecting the learning

In the questionnaire, the teachers were invited to reflect on how ICT has an impact on the concept of the classroom, and 13 of the participants directly mentioned that by providing connection to the internet pupils are aware of the world, and seven other participants claimed that it removes the walls. A 23-year-old female teacher from the North East of England claimed that with Google Earth and VR, 'the school is

much bigger than four walls', and for a 29-year-old male teacher from Scotland and a 35-year-old male teacher from Essex, ICT makes the classroom a portable thing. The idea of a connected and portable classroom is reflected in the words of a 35-year-old female teacher from Devon, who said that that the internet is 'opening the door to a world of possibilities.' The idea of connecting everyone was echoed by a 34-year-old female teacher from Warwickshire, who stated that it builds communities and gives 'everyone a voice/role/impact.' It was frequently mentioned by the teachers that technologised education involves independent learners, a student-centred approach, a connected and extended classroom, and a mobilised form of learning that leads to interactive and engaged learning.

Some schools have banned mentioning the school on social media, because it has caused some problems in the past with staff making inappropriate comments on social media (SENCO2). Another school has also decided to keep their school life and social media separate, as SENCO4 stated, but they had a blog to communicate with parents and the public. Teacher4 argued that she kept her school life and social life strictly separate, and she did not even have any colleagues from school as friends on social media, and she did not post anything about her school life.

> We do use our blog and Year 2 has a blog, so any member of public can access the blog, can send messages, post comments on the blog that we post. We find that communication between us and parents through the blog is quite successful. (SENCO4)

Schools and people are connected through social media, and some schools connect themselves to the outside world through their blogs or social media accounts. They share their work on their accounts and celebrate the achievements of their pupils (SENCO2). SENCO4 gave details of the app that they used for real-time communication with parents. They had an app called 'Sims', which sends emails and a text message straight away if a child has been given a detention, with the reasons detailed. With this real-time information, parents can follow up on their children's learning, and they are connected to the classroom in real time. Even if the school

does not have the opportunity to discuss an issue with parents, the parents are informed about it, and 'when the child goes home the parents can have a conversation about their misbehaviour' (SENCO4).

One teacher said that he used online platforms to connect his pupils with pupils from other parts of the world, and found the idea very supportive for learning. Therefore, teachers find blending online and classroom learning more helpful for effective learning. Teacher2 argued that the future of education is in the form of online learning, but it can put a distance between learning and pupils.

> I've been trying to link with children in Canada and Greece. (...) I see the future of education being in the form of online learning, but still it can be distance learning as well. (Teacher2)

5.5 ICT and learning

There is a common understanding that pupils 'find things on the screen a bit more fun' (SENCO1). Enjoyable educational activities engage pupils; therefore, it becomes a target for pupils, although as SENCO5 stated, 'ICT is only a way to meet a target, it's not the target.' She said that educators need to make sure that 'it is purposeful', and when it becomes the target and reward, it starts to distract pupils from learning. It is a major part of the everyday classroom, and Teacher4 highlighted that ICT is 'in every lesson, so the children will be researching, they will be using the internet for research, they will be using online dictionaries, practicing on Mathletics'. She stated that she particularly enjoyed using the iPad because she could write on it to show the children where they need to make changes. She used 'Explain Everything' whenever she needed it, and it supported her teaching a lot. Microsoft PowerPoint was an essential tool for teachers, and they said that they have presentations for every lesson which they thought helped them to structure the lesson and provide visuals for each topic.

5.5.1 ICT as a reward

In the questionnaire, many teachers said that they saw technology as a reward and incentive to engage pupils in educational activities. The participants in the interviews also pointed out that technology is a perfect tool to motivate pupils, and they used it as a reward and motivation for educational activities. As can be seen from the responses of the interview and questionnaire participants, seeing ICT as a reward incentive is common understanding among teachers. There are, however, many teachers who argued that using ICT as reward is counterproductive.

If ICT is seen as anything for teaching, it is seen as a reward by pupils, because they see it like a toy, and teachers use it by saying, 'If you get this piece of work done, you can go on the iPad and play an educational game.' (SENCO3). Pupils absolutely love iPads, and teachers use it to motivate pupils for learning. Teacher4 however, argued that 'I have to say I don't really approve of that sort of bribery; I think the bribery should be slightly different, but who am I to say if it worked.' Teacher6 said that in schools it was used for pupils with behavioural problems to motivate them to behave well. When pupils follow the rules, they get rewarded with the use of ICT, but she argued that 'they choose not to follow rules', and so a reward will be set for them.

> We also use ICT as a reward for the children who behave throughout the day. (SENCO4)

Using it as a reward or incentive can create problems and can change the nature of ICT from a natural part of the everyday classroom to a gaming tool. The teachers who participated in the questionnaire and interviews warned about this possible effect that the behaviourist reward mechanism makes pupils dependent on conditioning. Teacher1 also observed the problematic use of ICT as an incentive, saying that ICT is 'used as sanction and praise, so for example if you do this then you get ten minutes on the iPad, so it was almost used as like bargaining tool rather

than a tool for education'. SENCO4, however, had the experience of using the iPad as a reward, so that it stops pupils with behavioural problems from misbehaving.

> I don't think it should be used as an incentive; I think it should be used as a general everyday thing like reading a book. I think it's relied upon too much as an incentive rather than as an educational tool. (Teacher7)

SENCO3 thinks visualisation itself can be a reward for children, because they have a connection with these devices. 'There is a visual or an audio reward and I think children are very tuned into that.' (SENCO3).

5.5.2 Distracting

The teachers stated that they have observed that in some classrooms the iPad was used more freely, and pupils can be distracted, and they could end up watching YouTube videos instead of doing their tasks (Teacher3 and SENCO3). It therefore has to be monitored, otherwise it will be distracting more than engaging (SENCO4). Silly noises from pupils' working on iPads can be distracting and annoying when 30 pupils are working on iPads at the same time (Teacher4).

> If you manage it properly and the children are using it properly, I don't think it is distracting. I guess it can be distracting if the volume is turned up. The noise of somebody's game is distracting. (SENCO3)

Some pupils can be distracted even by a timer on the screen, and 'they might watch the timer instead of doing the activity' (SENCO1). There are off-task Google searches or YouTube video watches. They look for something to show each other and talk about it when they have freedom to use these devices.

> We have like silly Google searches, just showing, 'Oh, look what I've found on YouTube.' (Teacher5)

ICT can have an impact when it is not used properly outside of school time, because 'there is a lot of bullying going on with them, they're sending messages all night'

(Teacher3). She thinks it is quite worrying that they start to use technology like this from an early age, and it will disrupt their education when they are older.

> The parents give them the phones and they think they will be fine, and they're not. A lot of them play their games online until early morning. (Teacher3)

5.5.3 Engaging

In the questionnaire, the participants claimed that ICT is engaging because of the features provided, for example visualisation and animation. ICT is very quick, very effective and very visual; therefore, it is engaging for pupils (SENCO2), and they love seeing themselves on the screen when they are being filmed (SENCO1). With the use of ICT, pupils 'can feel more in control of their own learning, if they are able to swipe the screen' (SENCO3). It is also engaging because 'the apps are already using all kinds of new strategies and new improvements to capture the children's attention. So, ICT will do that for us, it will get their attention. It's never boring' (SENCO4).

Pupils are more likely to be engaged with ICT, as it enhances their engagement, but some pupils can go off-task (Teacher6 and Teacher7). Pupils who do not behave are punished for not being included in the ICT-based lessons, therefore they miss out on being part of it (Teacher1).

Digitising itself is engaging, and pupils like seeing the electronic versions of things (Teacher4). Schools therefore prefer to introduce ideas in that format so that they can create a connection between pupils and learning. She also said that achieving through levels gives excitement and a feeling of control to pupils, which makes them engaged in learning. Teacher3 also said that instead of teachers talking, it allows children to be active and own their learning, and thus increase their engagement. It will make them part of the lesson, and they will not switch off. Knowing that the work continues on the next page engages them to finish their work to move on to the next section. A teacher who took part in the questionnaire and a teacher who was

interviewed suggested that if pupils feel in control of their learning, they will be engaged more.

> I photograph the worksheet instead of giving them the sheet; the children are so excited to do it. If I'd given them a piece of paper, they wouldn't have done it. (Teacher4)

Manipulating the content on an iPad engages pupils and it allows them more freedom and flexibility (SENCO3). They can collaborate on these tasks better than on paper-based tasks. Pupils collaborate on what to do when they are working on an iPad.

5.5.4 Enjoyable

Enjoyment is found as a necessity for learning; therefore, some of the teachers from the questionnaire and interviews claimed that if pupils are not happy or enjoying a lesson, they will not learn. Making lessons innovative and interesting can bring enjoyment for pupils and will result in learning (SENCO2). Pupils want to spend time on an iPad, as they absolutely love it (SENCO4). Teacher6 stated that enjoyment is a necessity for engagement and achievement. However, five of the teachers from different backgrounds who participated in the questionnaire argued that the main aim is to support learning, not to make pupils happy or quiet.

Visual resources from YouTube are enjoyable and are supportive of learning (SENCO2). Pupils love visuals, and as Teacher7 said, 'They love a good PowerPoint.' She also said that Ofsted looks for whether lessons are entertaining, at least to some degree, 'because it shows that children are engaged, there is something different for them to see that we've made the effort to look elsewhere to enhance our teaching'. Pupils enjoy programming as well, and they often ask when they will have an ICT lesson because it is a fun way of learning rather than just reading and writing. Instead of a teacher talking, pupils want to do things themselves because they find the teacher talking boring.

> Without ICT, I think, there is a lot more teacher talk, and that's when the children switch off. If there is too much teacher talking, the children start to get bored. (Teacher3)

Pupils like to play with technological devices, and they can spend days working on Microsoft PowerPoint (Teacher3). So, for an art lesson, an ICT lesson, or a music lesson, they don't see it as learning in the same way as a maths lesson. Pupils think the subjects are fun because they don't have to write, and it's not necessarily right or wrong. SENCO4 therefore stated that they look for digital resources to make lessons interesting for pupils. However, he said that not all children are interested in things in a similar way, therefore, different approaches should be used.

> They can find making a PowerPoint the world's most exciting thing. Yeah, they can spend days making a PowerPoint if they want. (Teacher3)

5.5.5 Interesting and motivating

In today's climate, pupils relate to that and they have a connection with these devices, so it is essential (SENCO2). It is commonly found to be 'a very positive motivational tool' (SENCO1), and 'it's far more interesting' (Teacher6). The participants in the questionnaire also claimed that it is interesting for pupils and they are motivated when an educational activity involves ICT. Teacher4 stated, 'Whatever the latest thing is, it's motivating them,' for example, 'A few years ago, if you printed off a big version of an iPhone screen and got them to write a text message on that, that was really exciting, having your own iPhone.' When they see ICT devices, they get very excited and motivated and they want to work on them (Teacher1, Teacher4 and Teacher5).

> They are always excited when they use an iPad. If you use an iPad, they will always be more engaged straight away. (Teacher5)

Teacher6, however, thought that when they got used to the devices it becomes less exciting for them, and she said that this was not related to behavioural problems, but

all pupils feel less excited when they get used to the devices, therefore it creates behavioural issues. ‘ICT is more attractive because there are more graphics you can use on the screen, there’s noises, there’s bells and whistles they can have.’ (SENCO1). Teacher1 said that she tries to visualise as much as she can, because when it is visual, it gets their attention. When it is interactive, it is more motivational for them, and also if they can go and search for something on the computer, they are more interested in the topic because they feel in control and it engages them in learning (Teacher1 and SENCO1).

SENCO3’s one-year old baby knew what buttons to press to watch ‘Peppa Pig.’ ‘They are tuned in and it engages them more because their brains are wired that way.’ (SENCO3). They know how to use digital devices, and ‘it is using their own language, their own kind of world to access learning and to promote skills’ (SENCO4).

> They can focus more on watching a cartoon than they would watching a documentary, because it is brighter, more visual, more fast-paced, fast-moving. It’s few words and there’s fewer things to process. (SENCO3)

Pupils who have social media from an early age are competent in using devices (Teacher1), and Teacher6 said that a lot of pupils have technological devices at home, which makes them very comfortable with these devices. They are resilient and risk-takers, so they find an app when they need to do something. ‘They are used to it, therefore if you’re going to engage children, you have to work on what they need to engage them, not what you would prefer.’ They are very curious and excited about ICT, and Teacher1 said that as soon as the excitement and curiosity are maintained pupils will thrive educationally. New devices and new topics make pupils excited and curious, therefore schools should be looking to introduce new things to their pupils as a reward for achievement. Technological devices create the feeling of playing, therefore it is more a game rather than learning for pupils (Teacher7). She said that there is a culture of play and boundless access that is created with the use of technology.

5.5.6 Games

In the questionnaire, the teachers found the use of games beneficial for learning because they are animated, which leads to engagement. More than 20 of the teachers from different backgrounds evaluated technology and games as stimuli for pupils with SEND, because games which are designed for education have features of 'strict timetabling, small achievable activities, and instant feedback' (34-year-old female teacher from Warwickshire). It is a hook, a stimulus to get their attention and make them interested in new topics.

Games are commonly used in education to teach a topic by keeping pupils as engaged as possible with the fun and interactive aspects of games. Online educational games allow pupils to learn and play with pupils around the world with a purposefully designed game (Teacher3). Teacher1 also stated that if pupils are practicing maths and phonics skills, they do not realise that they are learning, they think they are playing games. SENCO2 said some pupils might find following the lesson difficult but they can improve their skills by playing games.

> There is another child who might find it difficult to follow a teacher delivering a lesson, therefore they might find it easier to have an interactive learning game to follow. (SENCO2)

Games are an interactive way of learning, and 'if pupils don't understand something and there is a game about it, the game scaffolds the progression quite easily; for example, fractions, it is always difficult because they have to visualise it. Then you can do it with resources, but it is almost in the sense of games', said Teacher2. Games can help gain an understanding of the topic and build confidence, because the pupils are familiar with the style and they learn it. When they play a computer game, they feel in control, and having constant rewards when passing a level keeps them engaged (SENCO3). When Teacher1 did not have anything to do to fill 10 to 15 minutes, she said that she found educational games from 'BBC Bitesize', which helped her to fill the time and also make it educationally valuable for pupils. It is an

essential time filler for her to find something visually stimulating and which at the same time helps learning.

Old fashioned games include more communication, turn-taking and social aspects, therefore pupils need to play all kinds of games to experience comprehensive development (SENCO1). Online games connect people wirelessly, but pupils are more focused on their screens, and it is not face-to-face. She thought that social games were better for pupils. Teacher6 thought that online games might not strengthen social skills because the pupils play with their digital devices all night, and they do not know how to deal with their friends. They are interactive devices, but 'they need social interaction, especially at younger ages; at this age they need to learn simple social skills like manners, saying please and thank you' (Teacher6). Parents should pay extra attention to their child's social skills development by controlling their use of online devices, she said.

One of the most commonly mentioned educational game websites is Mathletics, and teachers find it very supportive, 'specifically for the teaching of maths in primary school, and it has three different setups' (Teacher4).

> Mathletics has got a student setup where we can set homework and there are maths games as well. They love the games, but we can set it up, they can't access the games until they've done their homework. (Teacher4)

Another educational website for games is 'Purple Mash', which allows pupils to log on wherever they want, and pupils learn through a game-like structure (Teacher7). These websites provide touch typing games, spelling games, phonics games, and easy maths games (Teacher6). Teacher6 stated that pupils 'don't go to learning games when they have reward time, they go to games like Minecraft, which is supposed to be fun, they're created to be fun. So, I wouldn't say it is particularly helpful for learning'. When pupils are given the opportunity to decide what to do, they are choosing to play games, which provides fun for them. On the other hand, Teacher5 stated that he has used Minecraft to teach maths and linked the learning with the pupils' everyday lives. Also, two of the questionnaire participants, a 39-year-

old female teacher and a 40-year-old female teacher, both from Hertfordshire, said that they use Minecraft for maths and problem solving, and a 30-year-old female teacher from Buckinghamshire said that she uses it for social situations and communication skills.

> I've used Minecraft in maths lessons before to calculate the volume of Minecraft buildings. And I say, 'This is built with 1-centimetre cubes, so how big can this building be?' (Teacher5)

When there was a mention of games, the participants generally complained about non-educational online games which are not age appropriate (SENCO1) and are 'detrimental to children's social skills' (SENCO2). They play these games at home, but they have an impact on school life because the pupils mimic those violent games in school by hitting each other. SENCO3 stated that she had a pupil from early years watching his brother playing an 18+ video game, and 'all of it is in his head, these terrible shooting up, killing games'.

> Some of these games are age 13, and the parents are allowing their children to access them. (SENCO2)

SENCO2 thought online games are addictive, and then pupils 'find it difficult to withdraw from a game if they're winning or losing'. Games which can be motivating because they include winning, losing and interaction, can be addictive at the same time. SENCO5 stated that they have issues with the 'Fortnite' game, and parents are not dealing with the issue. 'They see their child is busy with the game and they can have free time; parents do not care about the rest.' (SENCO5). She said that 'some pupils play till midnight'.

> I think it can have a detrimental impact on pupils' behaviour. I think they can become very addicted to them, (...) and parents have come in and said, 'I really don't know what to do with my child.' I think it's quite simple: take it away. (SENCO2)

Teacher3 stated that pupils are quite cynical because when she is doing worksheet-based games they are not interested in points and stickers; they are interested in physical prizes. However, they do online games with interest because it includes killing. Teacher5, however, claimed that games like Fortnite should be used to connect pupils to their learning, and he said that he wants to use it as resource for story writing.

> We can get some sort of Minecraft involved in the classroom, or, we've banned Fortnite unfortunately from this school, but I would love to do a Fortnite lesson and get them to do a piece of writing about it. (Teacher5)

5.5.7 Increasing access

The internet increases access to information, educational websites, applications and programs (according to more than 20 of the participants in the interviews and the questionnaire). This access brings opportunities to learn at their own pace for pupils with SEND, and it makes them more comfortable with ICT (Teacher3). They can choose the topic of interest for learning, they can decide when and where to learn, and it gives them control of their learning (Teacher4). It increases access because electronic resources are vast and cheaper (Teacher7). Teacher7 claimed that if electronic resources are cheaper, they should be used widely to increase access for everyone.

According to Teacher5, behavioural problems are reduced because those kids have access to learning. It reduces behavioural problems and they find a language of education that they can understand, because the 'iPad has helped those children to access different types of learning' (Teacher5). The access to different resources, learning opportunities and collaboration are increased, and as a result behavioural issues are decreased, because everyone finds a way to learn (Teacher6). Pupils know that it can provide whatever they need, and they can manipulate the resources to meet their needs, and additional resources can be created by their teacher if needed (Teacher6).

> I would say the children with behavioural problems work better when they use some technology, because they feel like they're working on a platform that they understand. (Teacher5)

Pupils find ICT very familiar because they have access at home, therefore it can be used to reduce behavioural problems by giving them something with which they are comfortable. Teacher4 stated that they would like to set more homework based on the internet, but there are some children who do not have access to the internet at home other than a phone. The lack of access reduces the chances of accessing learning resources to which their peers do have access. On the other hand, technology needs to be used to be able to be part of the modern world, otherwise the access to things will be reduced (SENCO1). We would not be able to learn if the access is limited. Teacher7 said that we live in the culture of connectivity and access; therefore, it is difficult to separate things. Pupils who have the division between online and offline, their access is reduced, thus their chance of reaching their full learning potential is also reduced.

> I think it's definitely got its own culture (...) everything is online even if we don't want it to be. (Teacher7)

5.5.8 The use of IWB

An Interactive Whiteboard (IWB) is present almost in every classroom, and it is an intrinsic part of everyday learning. The IWB is used to present visual teaching resources such as a Microsoft PowerPoint, a video, or any other visual resources (Teacher2). It is in every lesson, and it is like a TV or visualiser.

> I use my smartboard for all lessons. I tend to use the notebook that comes with the smartboard for any presentations, so we can write on it, I can save it. Some lessons I use a PowerPoint to show them. (Teacher3)

Teacher6 said that she connected her notebook to the IWB, so whatever she did appears on the screen, and she was using this feature a lot rather than Microsoft

PowerPoint. ‘The English, maths and the topics are all shown up on the interactive whiteboard.’ (Teacher6).

The responses from the questionnaire and interviews demonstrate that the IWB is very central for teaching, and the teachers use visuals to help with learning. There is always a slide presented on the IWB to show ‘my kids what I want and what I am doing’ (Teacher1). Teacher1 used ‘like animated characters, and they will for example like be pretending to solve a maths problem. So, they can visually see that, ‘Oh, we’re doing maths first thing.’’. The IWB helps the teacher to navigate easily between work and go forward and backward if it is necessary for pupils. They ask when they need extra resources, and the teacher gives access to the previous work.

> They know all the information is on the IWB. They will be like, ‘Miss, can you flip to the other slide?’ because they know where all the information is. (Teacher1)

5.5.9 The use of iPads

It has been discussed throughout this chapter how iPads are commonly used for education, as the teachers who participated in the questionnaire and the interviews frequently mentioned that they use iPads. Therefore, it is an intrinsic part of the everyday classroom, like an IWB. The role of Microsoft PowerPoint has been mentioned in previous sections, and for iPad users there is ‘Explain Everything’, which is like Microsoft PowerPoint but available only on the iPad, and they ‘use it all the time’ (SENCO5).

If a pupil is not able to write, the teacher will teach them how to type on a laptop or an iPad, so that they can have access to the learning (SENCO1 and SENCO5), and three of the teachers who participated in the questionnaire discussed how, by increasing access, an iPad is supportive for pupils with SEND. Pupils find typing easier, and they can recognise letters on a keyboard.

> Dyslexic children can find it much easier to just type the correct spelling. (SENCO5)

The apps that are available on the iPad make it very applicable for teachers. Teacher1 used an app that 'allows pupils to practice their handwriting and practice like forming the letters'. When she did not have time to think of an activity, she would just give them an iPad, and they would use the apps that are suitable for them. She was always exploring and trying to find new useful apps for her teaching, and she even asked her pupils for the apps that they use.

An iPad provides flexibility in that it can be adjusted in accordance with the pupils' needs, which results in it being a joy to use. For pupils with visual impairments, they can make the text bigger and change the sizes of everything if they want, and 'they can make the colours right to make it easier for them to read' (Teacher4).

Pupils are very fluent in apps, said Teacher5, and she gave examples of how pupils benefit from iPads. They have a classroom app that allows pupils to share their learning on the board and allows pupils to be tracked on whether they are using apps effectively as well. Moreover, an iPad decreases the gap between more able and less able pupils, and 'children who are at the lower end can help themselves to be on track' (Teacher5).

> They've made adverts before, and they've made movie trailers, and presentations about books they've read. (Teacher5)

5.6 ICT for skills development

Based on the questionnaire responses, teaching through games and computer-based structured activities for literacy, maths and social skills is common. One teacher stated that she used 'maths worksheets, videos for grammar or contextualising vocabulary, subscription to online maths and reading tracker websites for children' (47-year-old female teacher from Cumbria). In the interviews, ICT was found to be an effective way to teach academic and social skills. Specifically, pupils are educated to be ICT-oriented in order to be able to be independent learners who can benefit from the opportunities that are provided with

technology (Teacher6). Being able to control their learning, the device and the content helps them to improve their academic skills, said Teacher6, specifically for pupils with SEND.

> Creating stop-go animation, giving responsibility for some tasks (checking tablets), producing their own blogs, using apps such as pic collage to produce posters and explanations that don't need lots of writing. (59-year-old male teacher from Essex)

5.6.1 Literacy skills

The participants in the questionnaire, like those who participated in the interviews, said that they use applications for literacy skills frequently, and a 54-year-old female teacher from Harrow argued that videos and games are effective for supporting language skills. Teacher2 said that they use spelling-based literacy games which focus on lists of spellings that the pupils need to learn. SENCO2 said that teachers use computer games to teach phonetics, and pupils learn through modelling. They also use videos from educational websites for story writing tasks and learn about the story line through a video. There are websites such as 'Espresso' and 'Phonics Play' for literacy games, and schools prefer to use them with iPads because it is easier to work with. SENCO4 said that they 'use apps to promote reading skills and to do interventions in the phonics areas.'

If a child with autism 'does not like the way he writes something, he will have a meltdown, so we use word processing so that at least they know whatever they are typing it comes up very neat, and then we print it and then we glue it on the book' (SENCO4). They use touch-typing or word processing to prevent a meltdown and, as a result, misbehaviour.

SENCO5 stated that they use a program called 'Lucid Rapid', which is one of a few apps which can help pupils who have a disposition towards dyslexia. There is a specific website they use, called 'Dance Mat', which is part of the BBC, for touch-typing. A website called 'Storynory' provides stories for reading skills, and parents

are encouraged to read stories from there. Another website for reading resources is 'Oxford Owl', which gives pupils and teachers access to rich resources. Websites such as 'Spellodrome' are found useful by teachers for teaching spelling, because it provides real-time data for assessment to see where the pupil needs more support (Teacher2). Teacher1 said that she uses the technology of speech-to-text to help pupils who are reluctant to write a story but have good ideas for a story. Teacher6 said that she has used an app on the iPad through which the pupils created a comic for storytelling, and it was an interactive and engaging project for the pupils because they were in charge of creating and manipulating the content. These websites were referenced by the questionnaire participants when they were asked to name the three main online resources that they use.

> I had them say the story to the iPad, as the iPad basically typed it out for them, so it is a speech-to-text app. I can go and support the children that actually need help with the transcription rather than the composition. (Teacher1)

Teacher3 found showing a short animation about Dracula more helpful than reading them the story before making them write something about it. She said, 'They created so much better writing, because they could see it, and if they can see it, they can then start to write about it.' On the other hand, English is not many pupils' first language, so parents need to read a lot to improve their literacy skills, but they do not get enough support. Also, on the internet there is the language of emojis, which can affect pupils' language development negatively.

> They don't read, they don't look at what they should be looking at that will improve their writing skills. They're looking at messages full of emojis. (Teacher3)

5.6.2 Maths skills

Teacher2 said that they use games to teach maths and they use maths games for homework, and some of the teachers who participated in the questionnaire also found games essential to teaching maths skills. He said, 'If you want them to

understand 6+4=10, you can use cubes, or you could also use online courses that they can play and gain that kind of understanding.' More than 50 of the participants in the questionnaire suggested Mathletics and online games to support maths skills.

SENCO1 also said they use online games to teach pupils how to do addition or subtraction. Teacher2 also stated that fractions are always difficult, and that they need to visualise it to make pupils understand, so they teach it in the sense of games. ICT is always supportive for maths, as it provides visuals and examples for subjects such as shapes. Pupils can learn through apps and games with plenty of practicing opportunities, and it provides good base knowledge (Teacher2). Mathletics provides games and practices that pupils enjoy doing. They practice their skills with pupils around the world with competitive and engaging games.

> With Mathletics, the children will have their own login, and it allows them to do homework and do maths learning. (Teacher 5)

Teacher5 said that she also uses a video game called Minecraft to teach pupils how to calculate the volume of buildings by using 1-centimetre cubes, and the participants in the questionnaire also highlighted the importance of apps for maths skills.

5.6.3 Problem solving and metacognitive skills

High level thinking can be improved when the foundation layer, which is numeracy and literacy skills, is strong (SENCO1). When pupils solve a problem or play a game with ICT, they use their thinking and academic skills, and it improves their problem-solving skills (SENCO3). Problem-solving is best done within a group, said SENCO2, because they need to improve their social skills as well to be able to learn from each other.

> You give children a problem, they work together, they discuss, they share ideas. I think that's the best way. (SENCO2)

Pupils learn to solve problems. For example, when the code they have written does not work, they analyse the situation and come up with a solution. They learn to improve their metacognitive skills with project-based learning through applications such as ‘Swift’ (Teacher5). They learn from project-based learning that every problem can be solved step-by-step by breaking down the components and analysing them (Teacher7).

> We use the ‘Swift’ app for the computing lessons, which helps the children to problem solve when they’re coding.’ (Teacher5)

Metacognitive skills are essential for the age of information, because pupils need to be able to critique the information they find online. They will have projects and problems to solve, so they will go and look for information online and evaluate the relevance and the value of the information that they come across. There is negotiation and decision making all the time, said Teacher1, and metacognitive skills will be applied when encountering online information.

> At the end of the day, that showed me great learning, because I as a facilitator just critiqued and analysed where he’s got that information from, the source, so he went straight to the internet. (Teacher1)

Teacher4 also claimed that pupils’ questioning skills can be improved by using ‘a theory called THUMKS, and the idea is that every morning children come in and there is picture or a question that makes them think’, and she asks them every morning before assembly, ‘What do you think about that, why, who agrees with that, who disagrees?’ Everyday those metacognitive, analytical and critical thinking skills need to be supported, and she said, ‘It’s got to be little and often.’ Also, Teacher3 finds ICT supportive for explanation and demonstration, but metacognition can be developed through the discussion and argumentation of ideas, she said.

> It’s a good resource in showing them, but you want that child to independently do something. And it’s about your questioning of that child to get to what the answer is. (Teacher3)

5.6.4 Social and communication skills

In the questionnaire, more than 10 of the participants mentioned that using ICT allows networking around the world and supports communications skills with one another in the classroom through the use of monitored internal emails, as well as working with a partner and discussing when doing an ICT-based activity to support social skills. Also, three of the participants mentioned their reflection on how the consequences of technology related problems in relation to the common good can support positive social skills over video-based activities. A 34-year-old female teacher from Warwickshire and a 59-year-old male teacher from Essex said that they have found blogging useful for social skills, as it can lead to engagement with other people. However, a 47-year-old female teacher from England suggested, 'I would encourage them to use ICT less and interact more with actual people.' For communication and social skills, the teachers stated that they have many applications which are useful.

Apps are used to create social stories (SENCO4), and pupils with SEND communicate their needs using technological devices (SENCO1). However, communication needs are not of concern for Teacher3 and Teacher7, who both said that they think that pupils are capable of communicating effectively. Teacher4, however, disagreed that pupils do not have communication skills because they play games alone, and so there is no communication for developing language skills. Even though she said that she thinks that the way they use technology at home has a negative impact on their communication skills, she argued that there should be an iPad for each child. Parents don't talk to their children because they think a quiet child is a good child. She, therefore, said that she makes pupils 'work in pairs to force them to talk to each other, to discuss what they're doing'. Teacher6 also stated, 'Pupils have no idea how to speak with other people because their parents don't speak to them at home, they go online and they are on their games all day and all night and they're coming to school, and if they are on the computer, they are not talking to their friends, so they need social interaction, especially at younger ages.'

> One of the issues that I have with the children using all this technology at home is that they play games. And that's all they do, and that's very lonely. They're not developing language; they're not talking to people; they're not developing an ability to compromise. (Teacher4)

SENCO2 stated that in their school they use interventions for pupils with behavioural problems, 'where there is an adult and it's a small group and the child can talk through issues'. Social skills groups can help to discuss a problem and make pupils reflect on the consequences of their behaviours (SENCO1). They can learn through scenarios by 'watching a clip or cartoon where somebody's hurting another child', and by using video-modelling, 'you don't actually have to hurt the other child to show that they get upset and they cry' (SENCO1). Social skills group discussion can be built upon actual social issues or case scenarios in order to make pupils discuss their behaviours and other people's reactions (Teacher1, Teacher4, SENCO1). Teacher6 also did not suggest that ICT can be used to support social skills, apart from modelling through scenarios and videos, because it's a screen and there is not an interaction with a child who has got very good language.

Having access to online messaging apps and social media platforms creates communication problems, because pupils can send inappropriate things to each other over those platforms (Teacher5). Teacher5 said, 'They're on YouTube, Facebook or Twitter or Snapchat or WhatsApp, whatever of these apps they are using,' and, 'Quite often I have children come to me in tears in the morning, saying this person said this about me on WhatsApp.' Parents do not control their children's use of these apps, and every time these incidents happen, the school provides training to parents about how their child can 'use phones properly, carefully and safely'.

5.7 ICT and professional life

5.7.1 Role of ICT in professional life

Technology is imperative for professional development (SENCO4), because from communication to resourcing, this is the only place teachers go. 'Nothing can be done without ICT,' said SENCO5. Therefore, to make themselves more mobile, teachers have changed their PCs to laptops because they need their computers all the time. Databases help them share files easily, and cloud computing makes their job very easy. It makes file transferring and data sharing very easy when a child needs to move to another school or when different departments collaborate on a specific project, because everything is electronic now (SENCO5 and SENCO1). Also, many teachers who participated in the questionnaire argued that there are positive changes, as they can access things easily, there lots of resources available quickly, and as a result productivity is increased. There are technical improvements.

They do not teach any lessons that do not somehow include ICT, which is an essential part of teaching (Teacher2). ICT is an essential part of the teacher's toolbox, because they need to teach ICT and with ICT, but it does not drive teaching, it supports it, said SENCO5. It is imperative when they perform their role, and they feel that they need to teach children how to be tech-savvy. As SENCO3 said, 'We are at a transition stage in our life. This is the children's future. We're training them to do jobs we don't know even exist yet. So, they have to be ICT savvy.' Teachers need to keep improving themselves with ICT, otherwise they will 'be stuck to their own knowledge and their own experiences', and they might not be able to promote high quality teaching (SENCO4).

However, there is such a vast amount of information on the internet that one teacher said, 'I just kind of feel like there is not enough, although there is too much, maybe, if that makes sense.' (Teacher7). On the other hand, some participants feel that they are too dependent on teaching with ICT, but there is the possibility of ICT breaking

down. Therefore, SENCO3 argued that teachers need to be able to teach when the IWB does not work or the internet is down.

Social media is used by teachers to follow up on new ideas, other teachers, and educational websites or blogs for professional development, said Teacher5. Teacher6 and Teacher4, however, said that they think that using social media to follow peers does not help improve teaching skills, because people on social media are very opinionated. They said that they follow educational websites such as the 'Times Educational Supplement' (TES) and blogs on TES to get new ideas about education, resources and professional development. They also stated that they use Pinterest or Twinkle to get comments about a problem they have or read what people have shared that might be applied to their school (SENCO1). People don't respond to emails, so face-to-face communication is more effective with regards to collaboration.

Teacher1 stated that she has undertaken a few ICT Continuing Professional Development (CPD) activities, and subscribed to magazines in order to learn the latest information about ICT, therefore there is a need for ongoing development for teachers to be able to know about the state-of-the-art developments. One side of improving one's skills is watching YouTube videos, and Teacher5 said, 'I've learned so many things and I've had so many ideas just by watching YouTube clips about teaching, whether it is how to teach a specific lesson or whether it is how to use a resource effectively.' (Teacher5). In the questionnaire, the participants argued that there is a pressure to keep up to date and keep abreast of the latest developments.

> Schools want to be innovative all the time. They want to find new ways to do something because they want to stand out from the crowd. (Teacher5)

The teachers argued that there is a lack of guidance for teaching. They have to develop themselves continuously to be effective teachers, and with ICT, there are always new things to learn about and teach. Teacher3 stated that the training opportunities are not sufficient for teachers.

> That'll be very helpful if there was a constructed framework which said, 'Here is how you can use these tools effectively in the classroom, here are loads of resources which help you teach this part of the learning.' (Teacher5)

Online courses for different subjects are available periodically for teachers for their professional development and to learn how to teach more effectively. They have created expert groups for each subject to keep up with the latest legal changes in the education system and changes in the curriculum (Teacher4). Moreover, having access to comprehensive data about pupils and profiling them help schools to provide effective support, said SENCO2. ICT software brings together all of the relevant information about a child, including but not limited to assessment results, special support, attendance rate and SENCO/Teacher reports, so that they can access all of the information about a child at once.

> We have a system called 'Pupils Tracker', and all of the assessments go on the tracker. (SENCO2)

Teachers play a significant role in supporting pupils' learning by having a good plan, the knowledge of how to use ICT to support learning, motivating pupils for learning, and managing their behaviours (SENCO1 and SENCO2). ICT is not a magical tool, said the participants, and teacher support is always needed. The teacher is the role model from whom the pupils can learn social skills and how to behave responsibly. Teachers cannot be replaced, because 'the empathy that humans have for each other, the feelings, will not be replaced by a machine, because children need to feel a connection to the teacher' (Teacher2).

> We will still have a role, I think, because I think you still need to have that social and physical environment where the children have an adult who they can look to, who they trust, and who is a good role model for them. (Teacher5)

5.7.2 Collaboration between teachers and SENCOs

Good communication is vital for successful collaboration between teachers and SENCOs, because exchanging ideas and discussing the progress of a child can improve the outcome (SENCO1 and SENCO2). Meeting regularly is essential for collaboration to reduce misunderstandings as well. SENCO5 therefore stated that they 'get people meet and talk to each other, not just send messages to each other'.

> Teachers and SENCOs just need to keep an open dialogue. It's constant tweaking and changing your strategies to see which works with the child, and that just involves a lot of constant communication between teacher and SENCO. (SENCO3)

Collaboration is reliant on file-sharing and the mode of communication, which is electronic via emails or chat platforms. One school is now trialling a system called 'Microsoft Teams', which is a group chat software used to integrate people, content and tools, that they will use to support pupils who need extra support (SENCO5). Teachers have the independence to work on their classroom management strategies, so that they can find the best strategies to manage behavioural issues (SENCO4).

> We store a lot of our resources on shared networks so people can access it. (...) The Microsoft Teams approach will help us to collaborate on some joint projects. (SENCO5)

5.7.3 Collaboration with parents

SENCOs try to include parents in the education of their child, so they have parent consultations twice a year, and SENCO2 said that she meets 'with all parents of pupils that are on the SEN register termly. Parents are coming termly to sign the provision maps of all pupils that are on pupils' support. So, any child receiving an additional intervention meets with the class teacher once a term'. SENCO4 stated that they communicate with parents through emails and messages, as they have

software that sends messages to parents when their child gets a warning in the school. They run online surveys as well to include parents in decision making and follow up on pupils' development at home. SENCO5 stated that they provide workshops for parents for various topics, from how to support their child with SEND to English classes, so that parents can support their child properly.

> We're doing more and more workshops to help parents understand the dangers of IT, because the parents just don't know how addictive some of these games are, or they don't understand about blue light. (SENCO5)

Effective intervention needs ongoing assessment and collaboration between SENCOs, parents and teachers. Having feedback and evaluating the process can shed some light on the next steps, so that pupils have the right support to be integrated and included in educational activities. The TA is an essential part of this process.

> The impact of that intervention is then discussed with the person who is delivering it, so the teaching assistant. She will feed back to the teacher the impact of that intervention. (SENCO2)

5.8 Online resources

Online resources are commonly used by teachers, and along with IWBs, iPads and laptops, they are the main part of educational activities. All of the participants mentioned Mathletics; it is applied in the classroom as well as at home for homework, and 'Frontier' is used to set up activities for pupils, either in the classroom or at home (Teacher5; SENCO1). The websites 'Purple Mash' and 'Spellodrome' are also used for homework. With apps and websites, learning is online now, and it is connected to the internet (SENCO2). 'Espresso' provides factual instructional videos, and 'Access YouTube' provides advertisement-free YouTube and appropriate content for pupils. 'Twinkle', 'MyMaths' and 'Busy Things' are other websites which provide content and games for pupils, to motivate them for learning.

As SENCO4 said, they ‘use interactive apps to teach the skills because it teaches skills in an enjoyable way’.

The BBC provides many educational services, and ‘Dance Mat’ is one of them. There are websites to support literacy skills with stories and resources for reading and writing, such as ‘Storynory’ and ‘Oxford Owl’ (SENCO5). Teacher4 said that they ‘use ‘Tigtag’ and ‘Reach Out’ for science, and they look on YouTube a lot, as well as the BBC. ‘The BBC is brilliant for historical re-enactments, they’re fantastic and they do it specifically just for children.’ Teacher1 used a website called ‘Enrich’ to provide resources and learning activities for maths learning. Teachers use the learning platform of ‘Spellodrome’, which is useful for spelling, and there is another one called ‘Purple Mash’, which breaks down the curriculum in order to teach certain objectives (Teacher2). Teachers use ‘Literacy Shed’ for literacy, which has really good video clips for children that are two to three minutes long (Teacher3 and Teacher7). Teachers share their plans and slides to help other teachers, and Teacher2 said that if somebody has already done it, there is no need to create something from scratch, as it will be a waste of time.

> We use YouTube. There is a teacher resource website called ‘Twinkle’, a lot of us use that. They have a lot of really good PowerPoints. Other teachers have uploaded their resources to TES. We use ‘BBC Newsround’ quite a lot. (Teacher7)

Teacher2 stated that they use apps such as ‘ClassDojo’ for communication, and the app is used to gamify learning in order to engage pupils in educational activities. A 34-year-old female teacher from Essex who participated in the questionnaire said that she uses ClassDojo for positive behaviour reinforcement. Schools are looking for apps that address the needs of pupils with behavioural problems (SENCO4).

> We use a kind of system called ‘Imprint’, where you can get words with pictures to demonstrate certain words. (SENCO5)

Teacher3 stated that she generally uses the internet to download Microsoft PowerPoint, and 'not much else', which shows that Microsoft PowerPoint is always present in the classroom. A website called 'BigMaths' is used by teachers a lot, because it provides Microsoft PowerPoints and worksheets for students. Teacher3 said that it is like a whole package of resources for teaching maths. ICT is used to explain and show things to children to make them understand concepts with the help of visuals. Teachers need to make sure that the apps help the pupils' learning and higher-level thinking, because there are apps which are 'just very basic' (Teacher5). Online dictionaries and eBooks are used on IWBs and iPads (Teacher1).

5.8.1 Disadvantages

When the teachers were asked about the difficulties they face while using ICT, they stated that infrastructural breakdowns can cause problems. Many of the teachers who participated in the questionnaire claimed that loss of connection is an issue, and there are issues around software breakdowns.

However, the main problem is safety. They do not know what will come up on the screen, therefore searching on the internet is tense for teachers (SENCO1). Teacher3 said that she thinks that pupils are only interested in their internet use, and 'all they talk about are their WhatsApp groups and their games they play and their YouTube channels'. She said that although they can access information about the world on the internet, they are not using this power to enlighten themselves, they are not curious about learning things rather than enjoying themselves. 'It makes them more selfish and they're only interested in their short-term goals,' said Teacher3, and she thinks that they are only interested in their little bubbles and their social media accounts.

On the other hand, Teacher5 thinks that 'children shouldn't spend too much time on the applications.' Everything is more accessible, but children are more vulnerable on social media (Teacher6).

> It's quite worrying that they can look at anything online and they can find out anything in the world, but they're not interested, they're interested in themselves. And I think they're becoming more selfish. When you have an eight-year-old, the first thing they ask is the Wi-Fi password. (Teacher3)

Online resources should be carefully managed, because there is misinformation, and one of the teachers who participated in the questionnaire warned about fake news and misinformation. On the other hand, when pupils have projects and need to search a topic on the internet, they use things they have found on the internet as their own. They can easily fall into plagiarism, because they have fact-based projects which do not involve thinking.

> I watch my secondary colleagues, certainly for A levels, trying to root out plagiarism, because children have just gone on the internet and downloaded an essay and changed a few words. (Teacher4)

Technology takes human interaction away, as people just interact with screens. Before computers and smartphones, jobs and relationships were physical and manual, but now with the internet, people get connected and they don't want to do physical things (Teacher6 and Teacher7). SENCO5, therefore, argued that they try to teach children that computers, iPads and phones cannot replace real relationships. With the use of phones and social media, human interaction is reduced. This will bring more emotional attachment needs in the future (SENCO5).

> I think over the next few years we will start to see many more children who don't have the social skills. Not just students, the parents also are using technology far too much, and they're not physically communicating with each other. (SENCO5)

In the questionnaire, the teachers argued that inappropriate adverts and pop-ups, searching for inappropriate images, and blocking certain websites are common problems with the internet. Although teachers have a very positive perception towards ICT, they are aware of rising issues with these technologies.

5.8.2 Multimodality and visualisation

In the questionnaire's open questions section, the teachers stated that visual resources are the most supportive feature of ICT, such as interactive activities and videos for homework. In another open question related to the beneficial use of ICT, the teachers stated that the use of visuals and videos is supportive for engaging in learning, and they use cameras to record and evaluate pupils' progress (27-year-old female teacher and 40-year-old female teacher, both from London).

Visualisation helps to enhance educational activity. As SENCO5 said, they use iPads, for example, to mirror teachers, so that every pupil can see the teacher. Visuals connect with them at a level they understand, and they have access to additional features and opportunities created through this visual support (SENCO4). Pupils 'are very tuned in to visual things, and it does get their imagination in the same way the cartoons might, because it is brighter, more visual, more fast-paced, fast-moving' (SENCO3). Visuals are stimulating and engaging.

> We can't actually take the children to the moon, but we can show them the clips of the moon. We can't take them back in time to the Roman time, but we can show the re-enactments. (Teacher4)

Animation and graphical content get pupils' attention and make them focus on the learning. Teacher4 stated that they 'use a lot of images from the internet to inspire writing and to inspire discussion. Pictures are particularly good because you don't need to be able to read and write'. Teacher5 also stated that 'videos really help them, motivate them to do certain things in their learning, and it inspires them, or it is like a hook for a lesson'. 'Videos certainly make sure that children are more engaged, because pupils' attention span is very short.' (Teacher6).

There is a visual and audio reward in videos for getting something right, and it is engaging (SENCO3). 2D presentation is flat and not stimulating for pupils, therefore colourful and moving presentations increase their engagement and their achievement. Teacher1 stated that she uses animation for a pupil with autism who

struggles to understand words, so with visuals he gets engaged in the learning. It also supports pupils with literacy difficulties, as they also understand from the visual what the content of the lesson is. Animation helps children to access learning.

> You have PowerPoint users that create information, stick it on the board and go for it, and you have PowerPoint users that use PowerPoint to make notes or visual aids for them to deliver to their audiences. (Teacher2)

When pupils film themselves or create videos with the resources they have found on the internet, they take ownership of the learning. 'They need to be able to picture what it is they're trying to describe in the story, what it is they're trying to discuss.' (Teacher5).

5.8.3 The internet

Teacher1 said, 'The internet is one of the most valuable resources today to have in the classroom.' The internet is 'handy', especially when pupils ask really big questions (Teacher7). Teacher1 mentioned that there are many times in her day where she has said, 'I don't know the answer, let me just Google it.' Teacher2 also stated that there are many things that he does not know, therefore, 'The internet is a fantastic resource to be able to go and get knowledge quickly.'

Teachers in general rely on the internet to find resources and activities, and Teacher1 and Teacher3 stated that they would struggle without the internet. Teachers use it on a daily basis, and if they were not able to find resources on the internet, it would take extra time to create colourful and engaging content.

> If I didn't have the internet, I would probably have to use a lot more either photocopying or books. (...) It became quite unfashionable to use a textbook. (Teacher3)

Teacher2 thinks that the internet is used in an inappropriate way, as some teachers use it as a library or an index book which they can search and from which they can learn. He argued that 'the internet needs to be managed', and pupils need to be told

where they need to go and do searches, because 'the sources need to be validated, they need to be critical on what they select, and that's what you need to teach them'. 'Without the internet, teaching will be impossible,' because teachers use online resources too much and they can track pupils' development with internet-based projects and homework more easily (Teacher5).

> If I didn't have access to the internet in my classroom, we would really have a very big problem, because we wouldn't have YouTube, or Mathletics. (Teacher5)

Teacher5 stated that without the internet pupils would not be able to learn new skills such as using the internet safely and searching for the information they need. Cloud computing also makes teachers' jobs easier, because they do not need to carry file sticks around to have access to files. Electronic versions of resources reduce the burden of printing teaching materials, and this was found to be very significant for all participants. 'Teaching, planning and resourcing comes from the internet.' (Teacher1). Without the internet in the classroom, teachers 'wouldn't be able to just change the plan. Being a teacher, you should be flexible to be able to find things that help you on the spot' (Teacher6).

Finding relevant resources on the internet can be very difficult because of the vast amount of resources available online. Teacher6 has experienced at different times that she has spent too much time trying to find a resource, and at the end the resource that came up was not appropriate. Teacher1 said she found a Japanese video on fractions for a Japanese student who could not understand English. This sort of thing allows the teacher to be flexible and increase the access of the pupils to learning, because she could find the relevant resources on the internet very easily, and overcome the language barrier very easily. The issue around the internet is finding appropriate resources, because there is a vast amount of information on the internet that makes finding relevant information difficult.

> I was trying to look up the other day improving teaching and learning, and I find that the internet is kind of either amazing or awful. I've found that unless you know how to put the right buzzword in the search box, you can be searching for

> hours for the answer that you know you've got in your head. I know what I want my resources to look like, but I can't find that resource on the internet. (Teacher6)

5.8.4 YouTube

YouTube is commonly used in classrooms for teaching and learning to access visual resources, which is enjoyable (SENCO2). When teachers need teaching materials, they visit YouTube to find something relevant (Teacher7). Teacher7 said that she will 'watch it first' and evaluate whether it is age-appropriate and relevant for the lesson. Using YouTube itself can cause problems because of the adverts that appear on the website. They tend to download it beforehand or use 'Access YouTube' for advertisement-free videos. Many of the teachers who participated in the questionnaire said that they use YouTube frequently, to learn things or find videos.

Having access to many things also means that pupils will have access to negative things as well. Teachers, therefore, need to perform a gate-keeper role to help pupils' learning.

> Even just a short part of a movie, I need a segment perhaps, or I did a topic on journalistic writing, it's all there. (Teacher3)

Teacher5 stated that he finds YouTube a very helpful way to learn new skills, even how to teach, and he said, 'I've learned so many things and I've had so many ideas just by watching YouTube clips about teaching, whether it is how to teach a specific lesson or whether it is how to use a resource effectively. It is very important to understand that, and you can ask for help as well on the internet.' 'You can watch 20 million YouTube videos before they get what they need,' said Teacher7. Therefore, teachers think there is a need for a regulated YouTube. Pupils should have access to things which are only valuable for them, but Teacher5 argued that who will decide what is good for pupils is another issue in this case.

> I don't think YouTube is necessarily as strict as it should be. (...) I think YouTube should develop their apps themselves to make a classroom-based app for YouTube. (Teacher5)

5.9 Collaboration

The very basic idea of collaboration is to teach very basic social skills such as turn taking and negotiation in groups. It is taught by creating interaction among students, so that they learn how to deal with each other and participate in communication effectively. As Teacher4 stated, school is for socialising, and she said, 'We've got to learn to work together. And it's one of the big things about coming to school rather than being home-schooled.' They need to learn how to negotiate and take turns, because 'all of that, those social skills, are vital for problem solving' (SENCO2).

In the questionnaire, three of the participants stated that technology is supportive for interactivity and collaborative learning, so iPads are commonly used to increase collaboration and interactivity (three female participants from different regions of England). Collaboration is used to create interaction between pupils for improving social skills development, so that pupils can learn from each other in their social context.

Teacher1 stated that pupils should be given the opportunity to collaborate, and teachers should not avoid using collaborative practices due to the possibility of risks. She stated that this attitude allows pupils to learn from each other, and they warn each other when someone misbehaves (SENCO1). In some cases, the idea of collaboration can be very basic, as one participant stated that they use talk partner activities to create discussion among students, which allows them to improve their ideas and to elaborate their ideas and meanings with their talk partners. Discussion with their peers helps pupils to interact meaningfully and exchange ideas in relation to a social situation (Teacher7).

> We have collaboration in the classroom through talk partners. So, a teacher will deliver some kind of learning, she will then stop the session and say, 'Discuss this with your talk partner.' (SENCO2)

For collaborative activities, creating groups of pupils with mixed abilities and different skills can have a positive impact on group achievements, as was pointed out by the participants in both the questionnaire and the interviews. Changing roles between pupils with different skills is also found to be vital for effective collaborative activities, as it gives opportunities to every pupil to experiment with different roles in the group. Having the same role each time would decrease the effectiveness of collaboration, as the main idea of group work is making group members learn from each other (SENCO1). If during ICT-based activities tech-savvy group members do the main part of the work, collaboration cannot be implemented effectively.

> You pair them up, and what you find is you have two to three kids in the classroom who are super competent, and they can do everything independently. And then you have other kids that just will sit back and let somebody else take charge. (Teacher1)

5.9.1 Collaboration and ICT

ICT-based collaborative activities are praised by educators for their effectiveness. Teacher2 stated that pupils are more willing to collaborate if it is a computer lesson or project-based learning. On digital devices, tasks are done more quickly, so it enhances collaboration and participation, but this is not necessarily only the result of computer-mediated teaching; it can be enhanced with a book as well (Teacher2). Applications provide features of image and text manipulation and design for collaborative activities.

> I know there are apps out there where you can have children working together as a team to create maybe a newspaper article or a project. (SENCO3)

Pupils have difficulties in collaborating, especially if they want to use the devices themselves and they do not want to share with their peers (Teacher4). Structures and available equipment are not designed specifically for collaborative activities such that teachers can use these devices for collaboration. The devices are used in the school anyway, but the pedagogical underpinnings of collaboration are not considered such that a collaborative environment can be created within the classroom. The role of ICT for collaboration is increasing, as applications and websites are being used more frequently, and the participants in both the questionnaire and the interviews stated that ICT enhances collaboration.

5.9.2 Collaboration and SEND

Peer support groups are found to be very effective for pupils with different needs (five different teachers who participated in the questionnaire). As communication skills and turn-taking during conversation are improved through collaboration, pupils with SEND are also supported through similar strategies. There is 'a programme called 'Talk About' which is very much about working together' to understand themselves and their emotions. They gradually learn more and more about how to communicate with others, how to take turns, how to manage their emotions when they don't get what they want (SENCO5).

According to one participant, pupils can have the attitude of avoiding working with pupils with SEND or behavioural problems. Pupils with behavioural problems get told off, and their peers do not want to work with them because they don't want to get told off. However, Teacher7 stated that pupils see pupils with special needs as their friends, and they do not avoid working with them. Teacher1, on the other hand, stated that using mixed ability groups improves the outcomes of collaboration, but also there can be some behavioural problems with lower ability pupils.

> They still see that child with special needs as their friend and they want to help them. (...) So, there is not really any issue with behaviour, apart from chatting. (Teacher7)

Teacher3 stated that she doesn't like group practices, because ‘for the children who aren’t as good and aren’t as confident, they can hide in a group’. The same teacher said that she found it difficult to monitor every child in group practices, and individual work is more effective because ‘struggling pupils can get away with not-being challenged as much’. She said that she thinks that in principal collaboration does not work, because some children do not learn enough by avoiding participation.

> The children I’ve taught with any behavioural issues, they get worse because they can’t keep up with the learning as much and they’re behind, and that’s when they shout out, they don’t want to do the work. (Teacher3)

5.9.3 Collaborative Activities

ICT is commonly used to create collaborative activities, and the participants in general stated that they use activities such as creating posters or presentations as a group activity, and pupils are willing to share their work with the rest of the class. In some cases, pupils have even presented their work to the whole school in an open event. Five of the participants in the questionnaire stated that they find slides engaging and collaborative. Some of the other participants in the questionnaire also pointed out that using slides and posters is a common practice. A 31-year-old female teacher from London described how she organised a group for a philanthropy project, and they presented their project to a charity. This is an effective example of project-based learning.

A 44-year-old female teacher from Devon said that she used Google Docs for ‘live editing with a partner at the opposite side of the classroom, and it reduced communication breakdown in comparison with face to face encounters’, so there are examples of using technology to enhance collaboration and communication within groups. Pupils make presentations or write speeches together, and they show the end product to the class, so ‘it is for an audience and there is a reason why they’re doing that’ (Teacher3).

> I put on a competition for who could create the best poster. They used ICT to create their posters. (Teacher2)

Teacher4 uses iPads for collaborative Microsoft PowerPoint design, but for effective collaboration short sharp timing is necessary. Keeping children busy with sharp timing and specific targets helps reduce behavioural problems. Teacher7 also stated that creating slides is a common collaborative work, as pupils research a topic and then create slides for the topic as a group work. In addition to presentations, pupils 'love making trailers on iMovie', and 'that is a really good way for expressing themselves' (Teacher5), and this was stated by three of the participants in the questionnaire as well.

> If you give them like, 'You have 40 minutes to create this PowerPoint,' you get nothing from them. You say, '3 minutes to bring a plan to me, what are you going to do? On this plan, who is doing what? A, you put yourself down as doing absolutely everything, is that going to work? (Teacher4)

Pupils learn by watching how their peers do an activity, and teachers use collaboration to make them learn from each other. Due to a lack of devices, they work on the same devices, so when using iPads teachers need to design collaborative work (Teacher5). Partner talk is a common collaborative activity, through which pupils can discuss and share ideas or solve problems (Teacher6). Some pupils might prefer to work alone or just with another peer, and some pupils can work very effectively with bigger groups as well. However, Teacher6 believes that computerised learning is more like individualised learning.

> If someone gets stuck and can't find the right website or they can't type the word because they don't know how to spell it, they often jump up and help each other. So, it can become a group learning situation. But a computer is something where you don't talk to people and you can do all your work on your own, which has its benefits of course. But it can lead to individualised learning. (Teacher6)

One participant claimed that collaboration can be between individuals rather than between individuals and computers. Collaboration with AI is an unrecognised concept for some teachers.

> Not robots, not ICT, not iPads, so this might be my personal experience, but a lot of collaboration needs to be person to person, especially at KS1 and KS2. (Teacher6)

5.10 ICT in the classroom

The classroom is connected with the world, and Teacher4 thinks it has broadened things. However, she also argued that teachers do not go to the library because they find resources online. In classrooms, the focus is on learning programming, whereas before it was doing crafty things with computers, Teacher7 stated.

> It made the classroom more vibrant; you can talk with and email people around the world to find out what life is like. (Teacher4)

The teachers were asked in the interviews and the questionnaire about their usual day in the classroom, to gain a sense of how ICT fits into the daily routine of the classroom and how teachers position ICT for teaching and learning. ICT has a central role in the classroom, as the teachers said that they use it to present content via a smartboard. This shows that they organise their day around exam subjects to make sure that they are covered well. They cover maths and literacy in the morning, and ICT is commonly used by all of the teachers.

Teacher4 also stated that every day in the morning they do at least one hour of English and one hour of maths, but history, geography, music and drama are covered in half an hour weekly, as well as story time daily. This routine is similar to that of Teacher5, and he clarified that ICT is an intrinsic part of the daily practices of his classroom, as there are always visuals for each subject. However, he demonstrated that they need to use ICT more, as iPads are not integrated in every

lesson. iPads need to be used in reading, and therefore there is no need for books, as he argued that the same thing can be taught on an iPad.

> We will do maths lessons which will consist of using an iPad, and presentations using the iPad connected to the Apple TV we have in the class. (Teacher5)

Teacher6 stated that if pupils with SEND have access issues, she prepares worksheets for them to give them additional resources for their learning. She plans for pupils with additional needs to be included and supported. Generally, all of the teachers stated that they do maths, reading and English lessons in the mornings and extracurricular activities in the afternoon.

5.10.1 Curriculum

According to SENCO1, 'The curriculum is moving a lot quicker, and we have to cover a lot more topics. We're doing it in less detail, so we then encourage them to play these games to try sort of building on these skills.' Schools need guidance to teach, and they need clear objectives for what to teach in specific lessons (SENCO5). To achieve that, there should be a clear understanding of special needs, as several of the participants from different backgrounds stated in the questionnaire.

> It has just been left as a skeleton curriculum and (...) it doesn't provide a robust national approach, so when we do have something like how to help children deal with modern technology, there is no national support in the curriculum (SENCO5).

Teachers go to websites to solve the problem of what to teach and how to teach. These websites and applications provide clear guidelines and rich visual material for teachers, and the well-designed ones even provide tools for assessment as well. The teachers who participated in the questionnaire shared similar ideas about using rich resources in the curriculum to reflect real life. For example, a 54-year-old female teacher from London claimed that a 'creative curriculum' is essential, but not

overloaded with information. Teacher1 stated that there has been an increase in websites that produce educational content.

> So, for example, Tigtag is based on the curriculum, so I know that what's on there is relevant to what I'm doing. (Teacher1)

The curriculum and its resources are reliant on websites and applications, as the teachers stated that they are looking at websites all the time to maintain educational activities. With a vague curriculum, teachers are struggling with what to teach and how to relate it to the skills required to learn these subjects. They use educational websites to find resources on what to teach. Teacher2 stated that he uses 'Purple Mash' for teaching coding and computing, and more than 10 of the teachers who participated in the questionnaire also found teaching coding and programming essential for the future. The website 'is developed to help teachers to teach algorithms; it really builds a good understanding for later on in computer sciences' (Teacher2). Teacher4 stated, 'Some websites have been designed specifically for the curriculum, so Mathletics, Enrich, NCETM,' and added, 'Surprisingly, there is very little on how to teach coding, that you would think that there's a lot online to help you with coding. But I think that's so new on the curriculum. It's quite a challenge to get the right equipment.'

> For all of a sudden, we're told to teach programming, and unless you know about computers, that was hard for us. But the problem is the curriculum is very vague in these subjects, and schools don't all teach the same topics. (Teacher3)

5.11 Effective Teaching

Effective teaching for teachers involves putting pupils in charge of their learning, and teachers are facilitators who scaffold learning for pupils. The rest is under the control of the child, to link the learning to their life, and find resources from the internet if they want to go deeper. The teacher is a facilitator, and students are in charge of their learning, which needs to be linked to their needs (Teacher1).

Teacher2 provided some criteria for effective teaching, which includes a peaceful classroom environment of respect and calm, collaboration between pupils, and behavioural management in the classroom. Another significant aspect is to pace the teaching according to the pupils' needs.

> To be an effective teacher you need to be able to manage behaviours correctly, (...) an atmosphere of understanding and learning, (...) and you make sure that you pace yourself to that audience. (Teacher2)

When pupils make progress, achieve their main objectives, and remember the things they have learnt by applying them to new situations, this is effective teaching (Teacher7, Teacher3). Teacher4 stated that effective teaching is to teach pupils critical thinking and argumentation, rather than simply memorising information. Pupils need to learn to apply the skills and information they have learnt in real situations. Teacher4 thinks that education is 'setting them up for life, I am teaching them to be a citizen, I am teaching them what life is about'. She stated that they need to become sufficiently philosophical and thoughtful to compare things in order to make decisions. 'Also, cynicism, not believing everything that you read because children are so open to everything. So, education needs to move away from teaching facts into teaching skills.' (Teacher4). She argued that pupils ask basic questions in terms of Bloom's Taxonomy; they only ask factual questions, but she believes that education should be structured to make them ask the synthesising and application questions. She used 'philosophy for children (PforC)', where pupils run the lesson with the guidance of the teacher, and they were developing those application skills and synthesising their thinking (Teacher4).

Effective teaching is to engage pupils in teaching, and Teacher 7 stated, 'By engaging, I mean they have to be visually stimulating for the children, otherwise they won't want to do it.' Another teacher added that competitiveness is quite important, because the children need to see they're pitting themselves against something else. This is quite a stimulating factor when it involves ICT (Teacher5).

Teacher3 argued that ICT can be used for the sake of using it without considering whether it will benefit the pupils' learning. SENCO5 also criticised the use of ICT for the sake of it. They think that the pedagogical implications of ICT are not thought through to improve pupils' learning, but teachers just want to show that they are using ICT. 'Weak teachers might fall into a trap of using IT, thinking that it looks good. It is just one of the ways to teach.' (SENCO5).

Effective teaching involves activities that are fun, and children enjoy doing them. However, Teacher1 stated that some games might not be educationally valuable, because pupils will just want to compete to reach levels in the game, instead of learning. Moreover, two of the teachers who participated in the questionnaire argued that they do not aim to entertain the pupils; their job is teaching them. They use games and videos as a starter for a lesson.

Pupils can control their learning with iPads through bite-size learning activities in which they can go backwards and forwards, and in which it is broken down for them really clearly (SENCO3). Also, when pupils do not feel the pressure of doing something wrong, they will feel confident to try something new because 'the fear will not be there' (Teacher3). Doing wrong is a part of learning, but it can stop some children from trying. Another aspect for Teacher6 is to have rules and routines so that children feel safe and they know where they can go. Education needs to be nurturing, clear, concise and flexible, as well as having clear boundaries and expectations (Teacher6). Therefore, instead of telling a child off, teachers should create behavioural approaches to create an emotionally secure environment for all children. Instead of focusing on symptoms such as challenging behaviours, finding pupils' underlying needs will help teachers to have behavioural and pedagogical strategies for the classroom. ICT is an integrated part of learning, so it is not considered as a separate thing from education.

> You've got an adult with good classroom management skills who generally manages behaviours in the classroom well, and provides an emotionally secure environment for the children. (SENCO5)

5.11.1 ICT makes pupils independent learners

Teachers think that ICT allows them to give the necessary resources to pupils, and they can learn independently and pace their learning (Teacher1). They take ownership of their learning and improve based on the zone of proximal development. Pupils are staying in the challenged zone to improve with purposefully designed applications and games (Teacher4). One example of this is 'Swift', and another is 'Mathletics'. ICT helps to control the pitch and the pace, because if you create the resources effectively for your audiences, you will be able to pace it appropriately and pitch it appropriately (Teacher2). Two of the teachers who participated in the questionnaire argued that ICT broadened the classroom and provided access to rich resources that lead to making pupils more independent.

Teachers teach pupils to use apps independently and effectively in order to develop their learning through ICT, but for the early ages it might be difficult to give control of the learning to the child. However, websites provide rich resources for children to spend their spare time learning and practicing their skills at their own pace.

> 'Swift' is a great way of letting children learn independently. And also, with Mathletics, they learn independently as well about new things. (...) But at this age it's definitely hard for them to create and construct new learning on an iPad. (Teacher5)

One participant stated that they do not provide enough opportunities for independent learning due to the school culture and the age of the children (Teacher7). However, she thinks that pupils are very confident in using ICT at home, so schools can build on those skills to make them independent learners with the help of ICT. She has also served as a teacher in Cambodia and Pakistan, and she thinks that the independent culture of the UK leads pupils to own their learning and be independent (Teacher1).

In the information age, one teacher claimed that there are new needs for the educational system, such as pupils need to be thinking and analysing facts rather than learning things by heart. The needs and demands of pupils' time should be

considered by the educational system. Teacher4 also stated that there are brilliant pupils who are not taught well, but with the use of ICT, their learning can be personalised and enriched.

> In Finland, they're allowed to have tablets and iPads and computers in their exam, they can use the internet to look things up, because the exam isn't testing what they've learned off by heart, it's testing their thinking. (Teacher4)

5.11.2 Pedagogical value of ICT

It has been stated that short video clips and visual demonstrations are helpful to be used as an introduction to a lesson, depending on what the lesson is. Teachers use visuals as stimuli for a lesson, which will probably lead to interaction and collaboration through conversation on the topic. 'If it's for news-related things, like factual-based things, or we're learning about someone specifically, I will use it as a starting point for them to talk about this person and to learn facts about their lives.' (Teacher7). The process is to gain ideas to build on and stimulate learning and discussion for further development, but it is more demonstrating rather than instructing, so the teacher is the starting point. They will visualise the lesson via Microsoft PowerPoint to demonstrate the actual practice that is difficult to experiment on in the classroom.

> If it is topic-based or if it is science and we can't do an experiment for whatever reason in science, we'll watch one then we will talk about it, and then we'll watch it and then we'll talk about it more, and (...) it's just demonstrating, not necessarily instructing. (Teacher7)

The teachers and SENCOs were asked about whether ICT promotes individualised learning or social learning, as pupils use their own devices. One participant said that if the child is reading something and then working one-to-one or doing some maths learning one-to-one, and it's just for that one child, it depends what the activity is. However, they use technology to share pupils' work on the network, so that they can show other pupils and access it on different devices (SENCO3).

Teacher1 stated that the design of the lesson has an impact on whether pupils learn from each other by interacting with each other or by interacting with a device. However, apps and websites can be designed to allow pupils to interact with each other remotely. They are learning together, because schools might not have an iPad for each pupil, and they use it together so that they learn from a 'significant other' (Teacher1). Teacher4 and Teacher1 claimed that technology helps to build up pupils' learning in 'the zone of proximal development', which is another Vygotskian term. Teachers prefer not to give every child an iPad, as it will be very difficult to control them and will reduce the opportunity for group work, because there is no value in giving every child an iPad and having 30 children doing the same thing.

> Vygotsky's theory of the 'zone of proximal development' and 'the most significant other', when you want that sort of learning to take place, that's why you can use technology to support the social interactions. (Teacher1)

Also, another teacher was against using it for collaborative work, because she thinks that pupils need to learn to be independent learners. 'When they take a test, they don't take it with the group of children. They all need to be able to do things independently.' (Teacher3). The reason she is against it is because some pupils can hide in the group and do not contribute. This shows that teachers have different opinions on how and where to use collaboration for teaching and learning. However, Teacher2 stated that his experience with pupils was different, as they use their individual devices, and when they get stuck, they ask and learn from each other. This creates interaction between the pupils, and it leads to group learning rather than making them focus on their devices.

> They will talk to the pupils next to them. Teachers ask children to talk to the people next to them to gain an understanding of what they actually know. So, ICT is not necessarily individual, but it also helps groups as well. (Teacher2)

One school uses the internet to communicate with pupils and share resources with them. For spelling, they post on the blog the words that the children need to learn, and when they are at home the pupils will look at the blog to follow what to do for

homework (SENCO4). Having the resources for social learning makes a difference and changes the role of teacher and pedagogy in the classroom. Teacher1 compared her experience in the UK to that in Pakistan and Cambodia, and said that teachers in rich resourceful classrooms apply social learning and they are more like a facilitator rather than an expert in the classroom. She stated that by comparing different approaches, social interaction and experimentation are significant for teaching and learning. ICT-based activities are designed around a constructivist and Vygotskian approach, because they build on what the child already knows (Teacher5)

> We are like the facilitator, so we give them tools and tell them what to do, and then they have to go and do it. So, they're the ones that are in charge of their learning. (...) They [Cambodia and Pakistan] have a very behaviourist approach, whereas here it is more like a social approach to learning. (Teacher1)

Teachers need to have an idea for a lesson and then look for resources to teach this idea, otherwise they cannot benefit from online resources effectively (Teacher3). Planning and purposeful use of internet-based resources are based around the idea of what a teacher wants his or her pupils to learn out of a lesson, and Teacher3 raised the issue of the internet being a place full of 'any kind of rubbish'. Teachers always need to ask the question of whether pupils are learning from the way they teach, whether it is ICT-based or not, although nowadays all kinds of teaching include some sort of ICT (Teacher3).

SENCO2 stated that pupils with attention difficulties will be engaged more with ICT compared to teacher-based activities, because they see something on the screen, and two of the participants in the questionnaire said that they have found that ICT appeals to pupils with behavioural problems. Teacher3 indicated that it appeals to all children, as some children will find textbooks hard, so for engagement ICT is liked by pupils because it is visual, and they get the sense of play when using these devices. They perform tasks on the internet more quickly, but 'it doesn't build greater depth'.

> If I am doing it on Google Earth, I will type in 'the Thames', and I will find the Thames is in London, and it's quick. (Teacher2)

5.11.3 Construction of learning

Teachers are facilitators who provide rich resources that are available online, and pupils construct their learning on their previous knowledge with rich online information (Teacher1). Having everything available online reduces the need to structure every step with fine details, and teachers think that they can focus on improving their skills to find online information, evaluate it, and synthesise it. Therefore, with ICT, the theory of the construction of learning has become the central theory of learning for this age, and the teachers also shared this idea. Teacher2, however, argued the idea that pupils can direct their learning, because after a point they still need the guidance of a teacher to deepen their understanding. He stated that teachers are always there to take the learning onto the next step, so there is no future without teachers. Teacher2 made a distinction between facilitating and being redundant.

> That's the role of the teacher, to facilitate (…) I don't think teachers are now redundant, as somebody who puts something on the screen. (Teacher2)

Teachers bring new things to create excitement among pupils, so that they will be ready to learn new things as the motivation is there. This is the role of teachers, to stimulate learning and then reinforce it through further activities to make pupils really understand it. Teacher4 stated that teaching should be designed to improve thinking skills for a deeper level of construction of learning. The teachers commonly stated that pupils have the necessary skills to learn with ICT, as they start to use digital devices from a very early age. They even start to search on the internet from a very early age by using voice control features (SENCO4).

> If we're doing computing or ICT, they're developing their skills that they already have. So, they already know how to play computer games or whatever. (Teacher7)

5.11.4 Planning

Planning is significant for effective teaching activities, because the internet provides a huge amount of information and resources for learning. Therefore, more than 20 of the participants in the questionnaire argued that activities need to be planned carefully and pupils need to be monitored closely and guided for the effective use of ICT. It definitely needs to be planned, otherwise 'pupils won't be able to access a huge amount of information if it is not rightly planned and targeted to children's needs, and the plan is done for a reason; whenever the children have access to ICT in their class, they have a target, an outcome that is planned beforehand' (SENCO4). So, pupils will not be lost in too much information, they will only have access to the relevant information for improving their skills and learning.

> That's why you need to plan, you can't just let the children use the iPad just as they please. (SENCO4)

Planning makes it very fluent moving from one step to another purposefully, because there is a target to be achieved and skills to be gained at the end of the lesson. Teachers are able to evaluate whether the pupils have learned the desired outcomes and got anything out of the lesson, as the learning steps and outcomes are clear (Teacher3). However, this does not mean that everything will go very smoothly, so teachers should be prepared to improvise when their plan does not work, and 'it's about being reflective and understanding' (Teacher3). Planning involves mapping out the route and how you're going to get the pupils from where they are now to where you want them to be.

Planning is also important because some pupils learn slower or faster, so with clear learning steps a teacher can adjust the learning steps based on the pupils' needs. It allows differentiating lessons based on needs, because everything is planned, and the steps are clear for the different groups of abilities. Teacher4 also stated that a plan provides clear steps, helps to personalise a lesson to pupils' needs, and helps to make a clear connection between teaching and the national curriculum. If learning

steps are clear it will make it easier to follow up and build the next lesson based on the previous one.

> You always have those kids that can do more, so what I will do is for those kids, I will always take the next lesson plan as well. (Teacher1)

Websites and apps are essential for planning, and Teacher4 stated that she can't recommend 'Enrich' and 'NCETN' highly enough for planning maths lessons. They are also very good for providing clear steps for learning and structured lessons, which as a result makes planning lessons very easy for teachers. When Teacher7 plans her lessons which include internet resources, she does the activities herself to see whether it fits in with her plan, to avoid wasting time. Teacher5 also plans and trials resources beforehand for internet-based activities, and not just by using the app herself, she also trials it with a small group of pupils.

> We use 'Purple Mash', and it's good, but I like to have a go myself in case I do come across problems. (Teacher7)

In one school, the teachers have a planning day in which they plan their lessons or revise previously used plans to increase the effectiveness of their teaching. When they revise a boring or dry lesson, they bring more visuals and resources from the internet to enrich it and make it more enjoyable for the pupils (Teacher6). They share their resources and plans on 'Fronter', an internet-based database.

Teachers have many things to teach, and the curriculum is getting bigger, although there is a shift towards skills-based education rather than fact-based, informative education. It is therefore essential to have a very tight plan to be able to achieve covering the curriculum. Teacher4, therefore, claimed that planning is becoming more important, with regards to being able to cover the curriculum and make sure 'it's a focused piece of teaching'. On the other hand, Teacher4 stated that if a teacher does an internet search in front of the class, it means that they did not properly plan their lesson. She also said that she is not fond of allowing pupils to research on the internet, as they turn it into a game.

> If I am searching for something, that means I haven't planned my lesson properly. It means that I am not going to be able to look at it carefully or watch it before the children do, and there could be something really inappropriate in there. (Teacher4)

5.11.5 Data and instant feedback

Instant feedback is a feature of education, and connectivity and real time feedback allow the flow of data on pupils' learning. As SENCO1 explained, with the new technology, 'Whereas previously we might have taken a photo with the camera and waited to get the photo printed, we now want them printed instantly.' The demand for doing things instantly has increased with the features provided by technology. Teachers use the data provided by online quizzes to evaluate the effectiveness of their teaching and the pupils' learning, and identify the next steps. Teacher2, however, stated that having more data does not necessarily mean the effective evaluation of teaching and learning to improve it and act on it accordingly. Teachers should use it to inform their teaching and personalise their learning.

> I use a programme called 'Qohu'; it is an online quiz. (...) From this, I can see that five out of 25 of the class still don't know their eight times table. It is quick. So, I know that I need to address that. So, it would inform my next teaching. (Teacher2)

Real time data allows teachers to identify issues and evaluate pupils' progress in real time, so that they are able to increase the effectiveness of their teaching. Teacher5, for example, stated that websites like Mathletics support pupils' homework, and they can track it more easily.

> You see the progress those children are making. You can see where they were when they came to you. You can see on a week by week basis what those children do, their books. (Teacher3)

Besides informing teachers with regard to the progress of pupils, instant feedback informs parents as well, so that misconceptions and unlearned topics can be paid extra attention. It also informs teachers when they are planning their next steps based on data, and computerising data provides access to data whenever there is an internet connection, so connectivity is increased, and the next step is to connect schools with AI (Teacher4). They track their progress with real time data and assessments to inform the next step that needs to be taken. When they are using an internet connection and real-time data gathering activities, they cannot move to the next step until they get it right (Teacher7).

6. Discussion

This thesis presents the findings of a research investigation into the role of ICT in Key Stage 2 (KS2) classrooms to support the academic and social development of pupils with behavioural problems in terms of promoting collaboration and educational achievements. It will provide a detailed picture of the use of technology in the classroom, and how teachers interpret the impact of technology on their professional lives and pedagogical understanding. Understanding the pedagogical impact of technology and the ongoing transformation in and out of the classroom will lead to improving educational practices. The themes in the qualitative data cover the themes of the quantitative data; therefore, the discussion chapter will be organised around these themes. With regard to the research questions, each theme will be linked to the research questions to create a map of the relationships between the concepts that are aimed to be achieved through this study.

Research questions	Interview questions	Themes
1. What is the role of ICT in fostering the social and academic development of pupils with behavioural problems in mainstream KS2 classrooms?	1. What does a usual day in the classroom look like? 2. What kind of internet-based resources do you use? 3. How do you use ICT and online resources? 4. How does having access to the internet in the classroom affect teaching and learning? 4. Why do you use ICT and online resource for	1. affordances of ICT 2. education in the technological era 3. ICT and learning 4. ICT for skills development 5. ICT and professional life 6. online resources 7. ICT in the classroom

	teaching? 5. How do you perceive ICT in your professional life in terms teaching and pupils' learning? 6. What do you think about the ongoing development in the field of ICT? 7. In terms of the current role of educational technology, do you think education is reliant on ICT? 8. What is impact of ICT on pupils' behaviour?	
2. How is ICT applied in these classrooms to improve collaborative working between pupils with behavioural problems and their typical peers?	1. How can collaboration be promoted among pupils with and without behavioural problems? 2. What is the role of ICT in the education of pupils with SEND, specifically behavioural problems? 3. How do you use ICT to support pupils with behavioural problems' learning?	1. the understanding of behavioural problems 2. ICT and behavioural problems 3. ICT and learning 4. ICT for skills development 5. Online resources 6. Collaboration 7. ICT in the classroom
3. How do teachers think that ICT can support the	1. What is effective teaching practice for you?	1. ICT and learning 2. affordances of ICT

improvement of their teaching practices?	2. What impact it has on the development of problem solving, analytical thinking and metacognition? 3. How can a student-centred approach be employed effectively with ICT? 4. How do you integrate ICT in your practice? 5. What should be considered when planning ICT-based activities in terms of effective teaching practices?	3. education in the technological era 4. ICT and learning 5. ICT for skills development 6. Online resources 7. ICT in the classroom 8. Effective teaching

1. What is the role of ICT in fostering the social and academic development of pupils with behavioural problems in mainstream KS2 classrooms?

First of all, the teachers' understanding of behavioural problems is analysed, along with how ICT is used to support pupils with behavioural problems. Other related themes were ICT for skills development and the affordances of ICT to analyse what the role of ICT is.

2. How is ICT applied in these classrooms to improve collaborative working between pupils with behavioural problems and their typical peers?

The themes related to this question were how ICT is used in the classroom, ICT for professional life, collaboration and ICT, and how online resources are used in the classroom.

3. How do teachers think that ICT can support the improvement of their teaching practices?

This research question is a more detailed version of the first research question and is specifically focused on the pedagogy of ICT and how teachers position ICT to make education more effective. The related themes were education in the technological era, ICT and learning, ICT for skills development, the use of online resources, and collaboration, which links this question to the previous one.

6.1 The understanding of behavioural problems

Behavioural problems such as autism, ADHD and emotional behavioural problems are common SEND groups among primary school pupils (Dawson et al., 2010; Sciutto & Eisenberg, 2007; Kern, 2015). The participants in the current study were careful about framing their SEND understanding such as the underpinning causes of a behaviour rather than seeing the behaviour as the by-product of the child. They, therefore, distinguish between physical disabilities and SEN that are related to behaviour, learning and communication. Autism, ADHD and emotional and behavioural problems are parts of SEN that cause disruption in social skills, which can result in disruption in learning (Berenguer et al., 2018). Disruption in learning does not just come from behavioural issues, it is also related to the executive function of these groups (Rosello et al., 2017). They have difficulties in understanding other people's minds and emotions, which is required to have meaningful relationships and communication with one's peers (Bogdashina, 2015). The participants in general said that they believe that pupils with behavioural problems have the ability to learn, but they fail because they struggle with self-regulation, which is part of executive function. In the interviews, the teachers and SENCOs stated that they are aware of the problems some pupils have with

regulating their behaviours so that they can socially engage with the environment and regulating their behaviours in accordance with educational activities, which requires following instructions. This provides further evidence that executive functions are essential for education, and activities need to be designed with the consideration of these pupils' needs. The majority of the participants who answered the open questions and took part in the interviews said that they understand that finding ways to teach pupils with challenging behaviours will likely reduce misbehaviour and increase achievement, which will result in increased self-esteem.

Data from the questionnaire shows that 103 of the teachers (73.6%) have worked with pupils with autism, and 107 of the teachers (76.4%) have worked with pupils with behavioural, emotional and social difficulties. All of the interview participants, seven teachers and five SENCOs, also said that they have worked with these groups, and behavioural problems are prevalent in their classrooms. In the deprived areas, the teachers reported more behavioural problems, as some of the interview participants are from deprived areas of London, but problems in classroom management and in relationships are increasing in general (Pritchett et al., 2014). These findings provide further support for the findings of Pritchett et al. (2014), who stated that there is a link between socio-economic conditions and behavioural issues.

Regardless of where the participants in this study are based in terms of their socio-economic backgrounds, the questionnaire participants were not very positive in terms of whether pupils with challenging behaviours are engaged better with ICT-based activities, because the mean score was lower than 1. Even for the questions of whether ICT supports positive relationships between pupils with and without SEND, or regarding academic and social development, the mean score was lower than 1, which demonstrates that they might have had difficult experiences with pupils. In contrast to that, Howard et al. (2016) and Vrasidas (2015) conducted studies which suggest that pupils with challenging behaviours and their teachers have had positive experiences with the use of ICT and remain focused and engaged

during these activities. However, there are studies in which a correlation has been found between the use of digital devices and attention problems.

Behavioural problems are understood by the teachers as being related to management and relationship issues, and they distinguished between pupils with SEND and those with general behavioural problems. The responses to the questionnaire's open questions and the interviews suggests that there are two different types of behavioural problems: some behaviours are related to pupils' special conditions, and some behaviours are unrelated to SEND, and happen because those pupils choose to misbehave. This appears to corroborate the argument made by Florian (2019), which is that each child needs to be evaluated in their own context, so that instead of stigmatising, the main focus will be on meeting their educational needs. All of the participants in the current study showed positive attitudes toward inclusion, which is highly likely to lead to supporting those pupils and integrating educational strategies that will support their education (Cameron, 2017). This demonstrates that inclusion means more than increasing access, because as with difficulties in self-regulation, having access to technology will hardly solve the issues around the education of pupils with challenging behaviours.

Behavioural observations are used to assess whether pupils have autism, ADHD and other behavioural problems (Weyandt & DuPaul, 2013; Frith, 2008). After strong criticism of the medical theory of disabilities and the clinical approach, psychologists and educators have focused on behavioural observations to identify disabilities (Cooper et al., 2012; Kern, 2015). This has led to a comprehensive evaluation of the underpinning causes of behaviour, and a humanistic approach has been embraced, as the current study's participants repeatedly emphasised that they consider each pupil's needs regardless of the diagnosis. They said that they assess pupils prior to referring them to a specialist, and they claimed that there are some pupils who need to be diagnosed with a condition but are not diagnosed so that the educational authorities can avoid providing funding for a TA for that pupil. Labels, therefore, are not the only way to support pupils with SEND if they have difficulties in accessing education. As Toye et al. (2019) discussed, labels can lead to appropriate treatment,

but they can also lead to stigmatisation. The participants stated that they provide the appropriate education regardless of the label.

In the classroom, general behavioural problems and behaviours that stem from pupils' SEND conditions meet in the classroom, and they form the everyday reality of the classroom in terms of management, relationships and behaviour (Ewe, 2019). The current study has demonstrated that behavioural problems are common and are a part of education, as the interview participants suggested that having pupils with different social and communication skills creates opportunities to teach pupils about relationships, communication, and social skills. Teachers differ in their approach to different groups by considering pupils' specific needs, but behaviours from different backgrounds form the classroom together, so managing the classroom includes general approaches to behaviour management. This also forms the ethos of a lot of schools, and many of the participants in the questionnaire and interviews stated that their ethos is 'inclusion for all' or 'fully inclusive'. Effective inclusion needs to be built on identifying barriers, ongoing evaluation of each child's progress, a flexible curriculum, collaboration among staff, and avoiding stigmatisation (Booth et al., 2002; Florian, 2019).

When needs are not met it leads to exclusion (Florian, 2019), thus the teachers who participated in this study suggested that having a clear behaviour policy and employing need-sensitive educational approaches can decrease behavioural problems, and as a result increase engagement in educational activities and inclusion. As the study by Pickl et al. (2016) demonstrated, teachers with fully inclusive understanding have inclusive tendencies regardless of their experiences, and the participants in this study also showed that they hold positive beliefs towards inclusive education, although they have difficulties in terms of the education of pupils with behavioural problems. However, many of the teachers (based on the results from the questionnaire and the interviews) who took part in this study have a behaviourist understanding of education, and they themselves argued that the reflective constructivist approach is more inclusive. Although there were participants in the questionnaire and the interviews who suggested that using ICT as a reward is

bribery and does not motivate pupils for long, the participants in this study mainly suggested that using ICT as a reward is very effective.

Moreover, the participants in this study said that they believe that to thrive in this technological era, pupils need critical thinking and problem-solving skills, but Vanderlinde et al. (2014) argued that to support problem-solving skills, the constructive approach is more effective. This demonstrates that there is a contradiction between the teachers' understanding of education and their practices, because they revealed that they commonly use a reward-punishment mechanism and behaviourist external motivation factors. This clearly shows that, in reality, technology-based education has more of behaviourist tendency than a constructivist one.

As discussed above, inclusion can be achieved by being aware of pupils' need for self-regulation (executive functions) during educational activities. For example, they need to be able to get the most out of digital educational platforms by constructing their learning. The participants in this study in general appeared to corroborate the argument of Kirschner and Merriënboer (2013) that pupils are not aware of their needs, and therefore adult guidance is necessary. Pupils can be supported to regulate their behaviours during communication, socialising and education, thus they will be able to take turns in conversation and collaborative educational activities. The role of technology is also significant for self-regulation, as will be discussed later in this chapter in relation to whether technology helps pupils to self-regulate their behaviour and be aware of other people's emotions and ways of thinking. In the current study, it has been found that teachers use technology increasingly to support the different needs of pupils, including to promote inclusion, but there is a lack of discussion in terms of the impact of technology on self-regulation and executive function among teachers. They simply shared the positive discourse around ICT and showed that they use behaviourist teaching methods while having constructivist beliefs.

Fidgeting, noise, unnecessary remarks, disrupting peers, talking out of turn and fiddling with equipment are observed behavioural problems in the classroom (Hopman et al., 2018). There are also more severe behavioural problems in the classroom, such as fighting, using bad language, and refusing to follow rules, and these make classroom management difficult for teachers and disrupt educational activities (Roache & Lewis, 2011). The participants in the interviews and in the questionnaire reported similar behavioural problems in their classrooms, such as friendship issues, refusing to follow instructions, and inattention, which is a common problem in primary classrooms. There are also technology related behavioural issues such as overuse of smartphones, online bullying, and refusing to share technological devices, and Selwyn et al. (2010) also reported similar problems in the classroom.

The teachers said that they find the role of the TA essential for supporting pupils with behavioural problems, and it helps to reduce behavioural issues as there is an extra adult in the classroom for education and management. One teacher argued that instead of spending a huge amount of money on a technological device, she would rather have a TA for extra support. Considering that the participants in the interviews are from outer London, due to a lack of resources, they cannot bring in a TA easily compared to other schools. A TA is an essential part of inclusive education, and teachers need to use TAs more effectively as they become part of the pedagogy.

6.2 ICT and behavioural problems

Technology is commonly used to provide personalised and differentiated educational activities to pupils with behavioural problems, and it is an effective tool used to visualise learning and provide different representations of knowledge (Flewitt et al., 2014). A significant aspect of technology-based education is to increase participation, give access, and engage pupils in learning. The participants in the current study repeatedly stated that technology gives them flexibility in terms of finding resources, presenting knowledge, practicing learned skills and engaging pupils when supporting pupils with behavioural problems. When pupils with

behavioural problems are introduced to ICT, they are engaged in educational activities, but they are isolated from their peers (Andreassen et al., 2016). Pupils with ADHD spend more time on screen and gaming, which reduces their face-to-face social interaction. The participants in the questionnaire and the interviews also stated that they find the excessive use of technology problematic for pupils with behavioural problems, and they said that they think those pupils need support to control their use of ICT. This further supports the idea promoted in the literature that pupils with challenging issues have problems with overuse of technology due to difficulties in self-regulation. The participants in this study reported problematic use by pupils, so when creating ICT-based educational activities for those pupils, the focus should be on self-regulating skills rather than on the liberating discourse of ICT for all.

However, in the questionnaire, there were participants who said that they think having pupils with SEND in their class makes teaching with ICT more difficult, and 23 participants responded ‘somewhat agree’ (16.4%), seven responded ‘agree’ (5%), and three responded ‘strongly agree’ (2.1%). The number of neutral responses was also high, with 37 participants responding ‘neither agree nor disagree’ (26.4%). There were different responses among those teachers who have worked with pupils with autism, as they were inclined towards disagreeing, and those teachers who have not worked with pupils with autism. The participants in this study disagreed with the statement that the use of ICT leads to behavioural issues, just as with the previous statement, but there were teachers who participated in the interviews who agreed that some pupils display behavioural problems while they use ICT, for example looking at inappropriate images. These pupils have difficulties during ICT-based collaborative activities as well as during project-based activities. In the open questions of the questionnaire, the teachers argued that ICT-based activities create over excitement, motivational problems, and a lack of concentration. It also results in off-task behaviours and inappropriate use of the internet, as the participants in the interviews and the questionnaire argued. In the interviews, one participant mentioned that pupils take ownership of the device being used, which results in problems during collaborative work. The ownership of technology, as discussed by Aesaert and van

Braak (2014), makes pupils regulate their learning, but as the participants in the current study argued, being over-possessive of a device reduces the effectivity of collaborative activity.

Other behavioural issues around using ICT, as reported in the questionnaire and the interviews, are online bullying, accessing age inappropriate content on the internet, and overuse of technological devices, which then lead to disengagement from education. Flewitt et al. (2014), however, argued that the interest pupils have in these devices can be turned into an opportunity for learning. Some of the participants in the current study also see this over-excitement and interest as an opportunity for learning, and claim that using technology for education helps make a connection to their pupils' lives. On the other hand, some teachers see it as a problem, because pupils, being familiar with ICT, do not get excited when they see ICT, but these are the teachers who want to use ICT as a motivational tool and a reward. This, therefore, demonstrates that teachers need to be guided for their understanding of the pedagogical value of ICT.

For all of the questions that emphasised the positive role of ICT for supporting pupils with behavioural problems, the teachers were positive. For statements such as 'ICT is important when specialist treatment and support is necessary for pupils with SEND', 'pupils with SEND and behavioural problems are better engaged in ICT-based teaching activities', 'ICT supports positive relationships between pupils with SEND and their peers', 'ICT supports academic learning of pupils with behavioural problems', and 'ICT helps diversify teaching for pupils with different needs', the teachers were positive, and specifically for the last statement the mean score was 1.4. However, there was a significant number of participants who responded 'neither agree nor disagree' to these questions. This demonstrates that there are teachers who are not clear about the role of ICT, despite the positive discourse around ICT among researchers and their colleagues. In the questionnaire's open questions and the interviews there were enthusiastic teachers who said that they believe that they should use ICT more, and that pupils are more engaged in educational activities when the education involves ICT. The vagueness of the participants in the current

study can lead to a negative impact on understanding, as Graham (2011) discussed in his study in which he focused on the theoretical understanding of education.

Early interventions are vital for pupils with autism and ADHD, and it is important that they are educated around their specific needs (Friths, 2008). Social stories, educational application, digital games and communication tools can be used to support the development of social, academic and communication skills. The participants in the current study argued that their schools have intervention strategies for pupils, and they set individual targets based on individual assessment plans for pupils. The teachers and SENCOs claimed that managing behaviours and having an effective intervention plan can reduce misbehaviour and lead to effective learning. Instead of shouting at pupils, they motivate them, try to understand the underpinning causes of their misbehaviour, and distract them from these causes. Giving them technological devices and making them watch videos or cartoons is not distracting them, because it can escalate the isolation and create new behavioural issues. Pupils' use of technology needs to be managed to increase opportunities for interaction between peers, so that distraction will not lead to isolation. Educators have claimed that removing barriers could support creating effective interventions, as the pillar of inclusion is to remove barriers and give access to education (Terzi, 2014; Florian, 2019). The participants in the current study stated that addressing needs, behavioural strategies, finding relevant interventions, customising these interventions, and effective planning will lead to reducing misbehaviour and improving educational outcomes.

In the questionnaire, the teachers were asked whether 'ICT has a positive impact on classroom management', and they were positive towards this statement. However, they disagreed with the statement that 'ICT has a negative impact on classroom management'. In the classroom, the teachers who participated in the current study said that they find ICT helpful for managing the classroom in terms of behaviours, but in the interviews, the teachers and SENCOs argued that pupils bully each other on the internet, they overuse the internet, they are obsessed with their YouTube accounts, and they access inappropriate things. The main challenge for teachers

when dealing with pupils with behavioural problems is off-task behaviours in the classroom (Farmer et al., 2014). These behaviours are part of the special conditions of pupils with behavioural problems, and as well as that there are general behavioural problems in the classroom, as identified in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) (2013). Intellectual disabilities and learning difficulties can also accompany behavioural problems, which are linked to a lack of control when dealing with people or difficulties in understanding other people's minds or emotions (Stoesz et al., 2016). Pupils with behavioural problems have difficulties in controlling their behaviour during collaborative activities, because they have to share the device with someone else. The participants in the current study also stated that pupils can easily get used to a tool or an application, which means that they feel less excited, and so it will have less impact on their learning.

When employing a technology-based intervention, these aspects need to be considered, but this demonstrates that the participants in this study overemphasised the motivational aspect of technology. In the literature, motivation in the right dose that keeps the learner at the optimal level of novelty and difficulty can provide the perfect readiness for education, as Beserra et al. (2019) discussed. However, inner motivation is more effective than motivation based on external factors, as Hanus and Fox (2015) discussed, and technology relies on external factors for motivation, which includes the logic of gamification (Cardoso-Leite & Bavelier, 2014). The findings of the current study demonstrate that the participants are using technology as an extrinsic motivational factor to make pupils participate in educational activities. This might be the reason why they are not getting the most out of technology, although they regard technology as a positive tool to support pupils' learning. The findings of the questionnaire demonstrate that the participants have positive attitudes towards the role of technology in learning.

The main idea around the use of ICT for education is that it will increase the personalisation and individualisation of education by allowing all learners to learn at their own pace (Beauchamp, 2012). Technology is believed to emancipate learners from the limits of the institutions, which consists of the limits of teachers, pedagogy

and policies, therefore when the learner takes control of the learning, he or she will be emancipated (Craft, 2012). In the questionnaire, the participants were asked whether 'a student-centred approach can be employed more effectively with ICT', and they were positive towards this statement, as the mean score was .43. However, there was a high number of participants who were neutral with regards to this statement (n=47, 33.6%). Even though the participants in the interviews and the open questions of the questionnaire held a similar emancipatory discourse of ICT, the low mean score and the high number of neutral responses to this statement demonstrate that the participants in this study do not see ICT as such. For a similar statement, which is 'ICT is important when specialist treatment and support is necessary for pupils with SEND', the participants were more positive compared to the previous statement, as the mean score was .81, but the number of neutral participants was high (n=38, 27.1%). For another statement, which is 'ICT helps diversify teaching for pupils with different needs', they were even more positive, as the mean score was 1.04, but the number of neutral responses was also high (n=31, 21.1%). This demonstrates that although there is a discourse of personalisation, diversification and individualisation around technology, more than a quarter of the teachers avoided providing a statement on the matter. The findings of this study provide further evidence to support the view of McKnight et al. (2016) that emancipatory learning practices are more related to instructional methods rather than the use of ICT or positivity around ICT.

In the interviews, the teachers and SENCOs said that they tailor videos based on the needs of the child, and this helps to personalise and find a specific method of communication for each child. Bite-size learning and structured steps make personalisation easier, the participants in this study argued, because it is easy to adjust bite-size learning in accordance with needs. This helps to tailor education around specific needs, as a dyslexic child will need help in spelling, and a child with autism will need help with communication and socialising. Kearney et al. (2018) also argued that a technological platform that creates content for educational purposes involves clear learning objectives and steps, which makes it preferable among

teachers. Online learning platforms provide different activities and different assessment methods that empower the learner to build their independence for managing the process. On online platforms, there is real-time feedback to evaluate progress and offer additional educational support. Learning will help to boost pupils' self-esteem, as they will be able to learn. The significant aspect of this is to increase access for every child; inequality in access to technology causes inequality in learning and social mobility.

Pupils with SEND diagnoses are supported with an individual educational plan that leads to individualisation of the learning process and provides supportive interventions. The use of technology and teachers' perceptions towards inclusion are essential for the success of this specialised support. Having clear educational objectives and steps that are specialised around individual needs will probably reduce behavioural problems and increase engagement (Zikl et al., 2015). The participants in the current study argued that technology supports the idea of constructivism and individualised learning with the flexibility aspect of technology, because pupils have a chance to repeat the practice, take breaks more frequently than others, get additional visual support, access more resources, and feel that they are controlling their learning. Bruin (2019) also found technology critical for the effectiveness of inclusive educational practice. The teachers who participated in the current study appeared to consider the child's specific needs, use technology (i.e. games and videos) to motivate, constantly assess their approach, and have behaviour management strategies. In terms of supporting teaching and pupils' learning, the participants in the current study said that they believe that technology creates opportunities for flexibility to change plans and address specific needs. For example, tablets allow pupils to manipulate visuals, teachers can record their lessons for pupils to watch later, they can practice educational games, and there are specific websites and applications which have been created to teach the curriculum and provide resources. All of these opportunities increase access and enable teachers to tailor their educational strategies based on needs. In the literature, these aspects are found to be essential, as well as the fact that they increase the

effectiveness of educational activities and support the special needs of pupils with SEND, especially those with behavioural problems.

6.3 Affordances of ICT

Affordance theory is related to the opportunities that are created for practice by a medium (Oliver, 2012); for example, the sharp property of a knife creates the opportunity, impact or feature for cutting (Kono, 2009). The affordance of technology is related to how users experience it, so one of the affordances is easiness, which is a combination of all of the features that make performance easier. Easiness is a very central idea of developing tools; therefore, the teachers who participated in the current study repeatedly praised technology for making teaching easier. The tendency towards things that makes life easier is related to people's lives, because they can integrate a device into their lives to make things easier, so a device is contextual and need-dependent (Chemero, 2003; Oliver, 2012). Therefore, educational technology always needs to address the needs of the educational community, and it should not be integrated for the sake of integration. Education and technology are cultural phenomena that need to be studied as processes rather than as artefacts, because what is perceived as easiness depends on the experience of the user. Portability, shareability, editability and flexibility make practices easier, but not only practice, the feeling towards the experience is changed. Therefore, how teachers perceive technology is significant for understanding how they really experience it to be able to analyse the way they use it for their practice. In line with previous studies, the participants in the current study said that they value technology based on the opportunities created for practice.

Pupils from an early age can use these devices, and they are able to manipulate the content on the internet that makes teachers use these devices. Touch-typing, safety and storage capacity appeal to teachers and pupils, as the participants in the current study suggested. This further supports the view of Chelkowski et al. (2019) that due to these features ICT is used to support pupils with challenging behaviours (i.e. autism, ADHD, EBD), because it is appealing to those pupils. The teachers argued

that they use tablets because of their portability feature, and it gives them flexibility in time and space, as it is argued that all of these features together bring easiness and usability. The participants claimed that technology brings flexibility when it comes to accessing things and revisiting them, as well as the flexibility of access regardless of time and space. One teacher argued that technology provided her the flexibility to be present as she can record herself, and therefore be present in different places and at different times. The ease of operation and sufficient functionality satisfy users through the accomplishment of tasks, which leads to an increase in the integration of the device in everyday life (Couldry & Hepp, 2016). It is this functionality that makes teachers think that they need to use ICT more, but they always feel that they do not use it enough. In contrast to conventional thinking on positivity towards ICT, the reason for this positivity is maintained by enhancement in functionality; rather, it is the feeling that ICT is always functional, but it is not integrated enough to realise its easiness.

This is related to the feeling that is associated with the use of technological devices, which is that people want to feel progressive and innovative, so there is a race in the adoption of the state-of-the-art technology. Moreover, improvement and progress are signified through the lightness, smallness and usability of a device. Also, it is related to the portability of the device and the ability to ‘be on the move that signifies the freedom’, as per the argument made by Bauman (2013), and this brings people’s feelings towards technology to attention. These feelings are related to the emotional affordances of technology, and one teacher who participated in the current study argued that these devices make people feel modern. The newness of the device and the software motivates pupils to use them. Another teacher who participated in the current study argued that pupils also love the idea of being on the screen in parallel with these emotional affordances, so the idea of their videos being played on the screen motivates them to be active during ICT-based activities.

The flexibility of technology can perhaps be seen as related to the 'liquidity of modernity', as Bauman discussed in his book ‘Liquid Modernity’ (2013) with regard to its powerfully transformative role in human life. Teachers and schools are also

affected from this trend as their roles are adapting to the ever-changing technologies. This is often something that causes uncertainty for teachers who are continually trying to balance 'the knowledgeable other' (i.e. the internet) and the constraints that they face in their schools. It is also related to the emancipatory discourse of technology which gets its power from liquid/post/second modernity, especially as we live in individualised societies where communities are no longer the 'shelters' that they often used to be in the past (Bauman, 2001).

Another of the emotional affordances of ICT is competition, which is sustained by the immediate feeling of reward, and this can be achieved most effectively with games. Shaffer (2008) argued that games are the future of education, as they are built on the idea of competition and reward. The participants claimed that competition keeps pupils engaged, thus it reduces behavioural problems. They love applications such as ‘Mathletics’, because it is competitive; they love the idea of beating a friend, and this is achieved most effectively through games. Applications are designed around the idea of keeping people inside and making them spend more time on their devices, so they are built around the idea of gamification, which makes competition a feature that accompanies almost all educational applications. However, the teachers who participated in the current study claimed that competition creates behavioural issues and pupils become selfish, as they are obsessed with winning. In contrast to the understanding of gamification, which builds itself on the feeling of ‘almost winning’, as Alter (2017) discussed, it attaches pupils to the device and the associated feeling rather than learning. The teachers who participated in the current study have a dilemma, because they argued that pupils are selfish and are obsessed with winning, but also they see competitiveness as an aspect for engagement.

Technology is commonly used because of its features, and speed is one of them (Pritchard, 2007). Speed is an accompanying feature of easiness and usability, thus there is a chase for faster internet connection and computational power (Couldry & Hepp, 2016; Bell, 2006). Therefore, when the participants in the questionnaire and the interviews talked about the advantages of technology, they said that everything is quicker, and that they see speed as equal to effectiveness. It is also related to the

speed of searching for something and gaining knowledge. The SENCOs and teachers who participated in the current study said that they can communicate faster with parents and pupils, which increases effectiveness. It seems that speed is the aim, as the end justifies the means. Speed is irresistible and slowness is unacceptable, as it is against efficiency, so 'speed is the hope of the West' (Kroker, 1992, p. 21). It is also related to time, which is considered in this study as one of the affordances of ICT, because making things faster and easier saves time. The participants in the current study argued that they save time while finding resources because on the internet everything is there to be explored. Time in the digital age is fast, flexible, interactive and about the moment, so users demand instant gratification and feedback. These features are not seen as behaviourist tendencies of technology in the conventional understanding of technology, as Zuboff (2019) criticised.

ICT cannot be imagined without the internet, which connects people and brings interactivity among its users (Dijck, 2013). It connects the classroom as well to the outside world, and allows pupils to interact with the world (Male & Burden, 2014). It leads to transcending the school and unleashing the bounds of space, which leads to pupils interacting with their peers all around the world. The participants in the questionnaire's open questions and the interviews said that they believe that ICT supports interaction, and they talk with each other, sharing their work over applications. There are social media applications that allow pupils to share their work on a platform, so the idea of interaction is social-media-like interaction. The impact of this understanding of interaction has not been discussed comprehensively, and the participants in the current study were also not aware that they have reduced interaction to a social-media-like understanding of interaction. Educational games, social stories and file sharing are the ways in which they use ICT to create interaction, so the teachers who participated in the current study still could not reach the level of using ICT for interaction and collaboration over project-based learning. The idea around interactive technologies has still not been realised. The interactions that pupils experience through educational applications are the interactions between learner and learner and learner and software (Luckin, 2018). The participants said

that they find virtual interactive simulations of famous stories, such as the Great Fire of London, engaging and exemplary for interactive educational activities.

6.4 Education in the technological era

All of the teachers agreed that the pace of development is difficult to follow, however in the questionnaire the teachers were positive (the mean score was 1.11), and the total number of neutral and negative responses was 35, as they were asked in the questionnaire whether they stay abreast of the latest developments in the field of ICT. This provides further evidence to support the view that ongoing changes in the field can cause uncertainties and disruption, which make teachers more cautious about adopting new technologies (Selwyn, 2016). The participants in this study stated that they think they stay behind in terms of these developments, and in the open questions of the questionnaire they argued that they partially adopt changes due to a lack of budget, time and experience, which causes a lack of the use of evidence-based technology in education. They do not have the required expertise to decide whether adopting a change will improve their practices. The teachers who participated in the interviews, however, claimed that they follow new changes and use new technologies, which leads to a race to keep pace with technology. They also said that they find it difficult to cope with the pressure of keeping pace due to a lack of budget, time and experience. One teacher who was interviewed was convinced by the discourse that teachers will be replaced by robots, or tools like iPads will invade the classroom, however she thought that it would have happened sooner. However, some schools cannot even afford to buy an iPad per child, as she stated, so how they will be able to buy expensive tools such as robots or AI analytic systems? In line with the conventional thinking that teachers are slow to adopt changes, the participants in the current study are also aspirational towards ICT, but have seen limited integration of ICT in terms of innovative pedagogy (Sung et al., 2016).

The discourse around ICT is that big and positive changes are coming, but schools still struggle to integrate ICT at minimal levels, as the teachers who participated in

this study argued. A lack of support and understanding is causing teachers to integrate ICT at a minimal level in contrast to what is being preached. They need to invest more time to improve their practices, but they face financial and technical difficulties. This has an impact on employing an effective student-based approach and providing sufficient support for all pupils, including pupils with SEND, as Mama and Hennessy (2013) analysed in their study. Another aspect of the difficulties in integration is related to the development of devices or applications, because when companies develop software and applications, the educational community is not in their mind, because their drive is profit, as one teacher argued. It is also related to the lack of evidence-based use of ICT in education. The participants in this study said that they have integrated websites and applications or tools such as Microsoft PowerPoint, 'Mathletics' or iPads, but there is still lack of understanding in terms of the pedagogical implications of these technologies. The high number of neutral responses to some of the statements in the questionnaire provides evidence of a lack of understanding.

Howard (2013) claimed that there is resistance towards changing practices, and teachers are unwilling to change due to a lack of skills and knowledge, but the current study shows that teachers are willing to change, however the pedagogical implications of technology are different, as it is claimed in the literature that it leads to constructivist, collaborative and project-based education. As discussed in this study, the design of technology is not constructivist, and the idea of collaboration and interactivity is limited to social-media-like collaboration and interaction. As Mama and Hennessy (2013) argued, there is inconsistency between what teachers say and their practices, but this is not just down to a lack of understanding and skills. The inconsistency between what technological companies promote for their products and the pedagogical implications of their products creates a lack of understanding. The participants in both the questionnaire and the interviews said that they face problems due to a lack of support and guidance from their schools, but the teachers who participated in the interviews stated that there are schools who use ICT for the sake of using it. In contrast to Ertmer et al. (2012), a lack of resources is still an issue for

the effective integration of ICT. The participants in this study said that they are confused, so in contrast to Loreman (2017), effective teaching practices in the case of the current study are not related to a lack of teachers' confidence. There is a need for a new educational model, and the current situation is that it is highly technologised but does not have the required technological infrastructure.

Teachers see smart devices as a necessity for their profession, and they adopt these devices into their lives and teaching very quickly (Bruce & Chiu, 2015; Instefjord & Munthe, 2017). In the questionnaire, the teachers were asked whether 'education is reliant on ICT', and there was a division between their responses. The mean score was .14, and the number of neutral responses was high (n=27, 19.3%), so the numbers of disagreements and agreements were almost similar. In the interviews, the teachers argued that a teacher cannot be very dependent on ICT in case of breakdowns, and their schools' technological infrastructure needs to be improved. However, some of the teachers said that they believe that without ICT it will be difficult to teach effectively, for the reasons that are discussed in the section on the affordances of ICT. As discussed in the previous paragraph, the teachers are confused, and the mean score for the statement 'education is reliant on ICT' was low, but all of their practices in one way or another include ICT. It is not ICT in its desired sense, as the educational technology literature evidences that there are many issues with the integration of ICT, but also, as the teachers argued, with ICT the classroom is without walls but is not fully freed from its walls. The participants in the current study said that they rely on the resources that they find on the internet, they frequently search Google while planning and presenting, and they integrate online applications into their teaching and learning practices. Therefore, there is a significant role for ICT in their pedagogy, and almost all educational practices rely on ICT.

Technologists believe that the future is brighter, because technology is working to solve problems and make every practice or task easier in the future (Postman, 1993; Somekh, 2007). The future that is being enforced on us by technology is irresistible, therefore the discourse is that all participants in society must stop resisting these

changes and embrace the future (Han, 2017b; Facer, 2012). With regard to this argument, in the previous paragraph it was discussed how teachers do not resist technology because they are aware that it is irresistible. The participants in the questionnaire were also in agreement with the statement that ‘the future of education almost certainly appears to be strongly technology-based’, as the mean score was 1.51. The teachers who participated in the interviews and open questions also argued that they need to use ICT more and they do not use it enough, so their schools stay behind. They need to be quick in replacing old technologies with new ones. They think ICT is becoming such an intricate part of every job at the moment, and in the future, so the future is ICT, but not in the sense of how transhumanists read the future (Bayne, 2015a). The centrality of technology to education as well as technology's fast changing nature often cause uncertainty; educators often feel that they do not have adequate opportunities or resources to investigate the usefulness and impact of every novel tool that they come across. This continual balancing act of keeping abreast of new developments is what Bauman refers to as the 'uncertainty of liquid times', not having a clue about next development (2005; 2013).

The participants said that they find technological skills and media literacy essential, and if schools fail to teach them effectively, pupils will lack essential future skills. One of the teachers who participated in the current study claimed that teachers will be replaced by robots eventually, because they can already project videos and search on the internet when they are asked a question. This demonstrates that she sees the role of a teacher as a person who brings resources and responds to pupils’ questions. In terms of technology, which is driven by profit rather than the needs of the education community, media literacy and robot teachers, the future is not clear in the sense of how technology will be used in the transition to these new schools and pedagogy as discussed in the previous paragraph (Bauman 2005; 2013).

Safety on the internet is of great concern for educators, and it is an essential skill for pupils to be safeguarded on the internet to thrive in the future (Selwyn et al., 2010; Male & Burden, 2014). Pupils start engaging in the digital world from a very early age, therefore they need to understand safety issues around digital consumption and

be critical of what they see on the internet (D' Agostino et al., 2016). The participants in the questionnaire and the interviews pointed out that online safety is essential, and they need to consider improving these skills when they design the curriculum. For some of the teachers who participated in the interviews, safety includes limiting pupils' use of ICT, therefore they should not use ICT at school too much, as they already use it a lot at home. The participants in the current study reported issues around searching on the internet, the availability of inappropriate content even with heavy filtering, misinformation, online bullying, and advertisements on websites. They use something called 'Access YouTube' for advertisement-free YouTube and similar applications, and also, they try every app before introducing it to pupils, to evaluate the relevance of the content that these apps provide. The teachers argued that they teach skills to evaluate the information they find online, and they perform a gatekeeper role to minimise the harm caused by misinformation, inappropriate content and online bullying. It is essential to teach critical, analytical skills so that pupils can evaluate the value of information and the intention of content publishers, because the internet involves not just bad things, there are also plenty of good things. In contrast to the existing literature (i.e. Selwyn et al., 2010; Male & Burden, 2014), safety is not just about the online experience, it is also about how teachers and pupils perceive things.

Teachers want to use YouTube because it gives access to everything, but at the same time they want the app to be strict in removing inappropriate content. One of the teachers claimed that they have problems with the overuse of digital content, and it causes problems in the classroom, as pupils sometimes spend the night using their phones. Online content is consumed commonly, and people are connected via the internet, therefore social media is a sphere to which school is transferred (Dijck, 2013; Selwyn, 2017). Some schools, as the teachers who participated in the current study stated, use their social media accounts and open blogs to share information with parents or publicise their work, but other schools have found this counter effective. There is a debate about whether online interaction will replace face-to-face interaction, therefore the participants in the current study claimed that schools need

to be a place of face-to-face interaction, because pupils already overuse the internet. The responses of the participants (in both the interviews and the questionnaire) demonstrate that the tendency is to connect the classroom with the outside world, therefore they collaborate with schools around the world over the internet. Classrooms are thus connected in some way, but it is not an emancipated connectedness, as Houlden and Veletsianos (2019) claimed, because as this study has demonstrated the understanding is limited.

6.5 ICT and Learning

There are specific impacts of ICT on learning, and the teachers who participated in the current study discussed the ways in which they use ICT and why it supports pupils' learning. ICT increases access, as pupils can use it on their personal screens and on a big screen in the classroom.

Teachers and pupils still use ICT as a reward which increases motivation, engagement and enjoyment, which result in learning (Hanus & Fox, 2015). The participants in the questionnaire stated that they find ICT engaging, and in the responses to the open questions of the questionnaire the participants said that they use it as an incentive for pupils with or without SEND to lead to desired behaviour. ICT is a hook used to engage pupils in educational activities, as it motivates and engages with its features such as multimodality, portability, and its game-like nature (Deterding et al., 2011; Pelletier, 2009). One of the participants in the current study argued that this playfulness and the feeling of playing a game is a new culture in schools. Some of the participants in the interviews suggested using ICT as a reward for pupils with SEND, but there are teachers who said that they do not find using ICT as a reward part of an effective education, claiming that it is bribery, or a bargaining tool. The common understanding is that ICT is a motivational tool used as an incentive, even for the teachers who said that they see it as bribery. ICT itself is a reward because of the features it provides, and it is appealing to them. According to the teachers, the early adoption of ICT into their lives for the new generation makes them relate to ICT, and as one participant said, 'Their brain is wired in that way.'

They find ICT more appealing thanks to its colourful and moving multimodal content (Mama & Hennessy, 2013). Pupils expect everything to be available on smart devices, but the problem for teachers is maintaining the excitement and curiosity that ICT brings, and it is discussed in the literature how external motivation lasts for less time. As discussed earlier, a behaviourist reward mechanism can be counter effective, as it will make pupils dependent on conditioning, so the emancipatory discourse and being dependent on external factors are living in the same body.

Distraction is a common problem for pupils with behavioural problems, and effective teaching requires motivating pupils and engaging them in educational activities, as discussed above. Therefore, the distracting side of ICT also needs to be discussed to gain a better understanding of the educational value of ICT. Although in the literature it is discussed how pupils are more engaged and less distracted during ICT-based activities (Howard et al., 2016; Vrasidas, 2015), in the questionnaire and interviews, the teachers reported incidents of misbehaviour and distraction. Although in the questionnaire the participants disagreed with the statement 'ICT has a negative impact on classroom management', in the interviews, some of the participants reported having experienced incidents of misbehaviour and off-task behaviours commonly during ICT-based collaborative activities. Pupils engage in off-task Google searches, and they show each other funny videos during activities. Pupils are distracted by design, because applications involve recommendations and related sources on their pages, which causes a shift in attention.

When it comes to ICT, the features that are engaging become distracting as they increase access to different resources, but teachers want their pupils to focus on one specific topic each time, even though there are attention-grabbing recommendations on the page. By making everything accessible, accessibility is increased, so the feature that makes ICT desirable is the problem itself, and one of the teachers suggested regulating YouTube. The design of ICT gives the feeling of being in control; for example, when the user swipes the screen, they feel that they are in control, stated one participant. Manipulating the content and swiping the screen is the culture of these smart devices that engage users (Selwyn et al., 2017). One of

the teachers who participated in the current study claimed that pupils want to see the digitised versions of things, and another teacher claimed that applications are considering all new psychological strategies to get people's attention. One teacher claimed that when pupils get used to a device, they get less motivated, so it is a race to bring out new devices. Pupils find new ways of presenting colourful content, and schools feel obligated to bring out new devices to keep their interest alive for longer.

There is a common theme around ICT-based education, which is that it should be enjoyable, as the participants said that they think enjoyment is a necessity. With the learnification theory, it is criticised how online platforms free education from its structural limits and spirits and turn it into something flexible that can be enjoyed in one's leisure time (Biesta, 2015; Houlden & Veletsianos, 2019). The participants in the questionnaire and interviews claimed that without enjoyment there is no motivation, and as a result no education. Ofsted also looks at whether lessons are entertaining, claimed one teacher, because it is seen as a form of engagement. Another participant in the current study claimed that ICT-based activities do not involve too much boring teacher talk, and the pupils are active, therefore they can spend hours creating a Microsoft PowerPoint slide. Technology is seen as equal to excitement, motivation and engagement; thus, the participants said that they think pupils cannot learn using any other methods. In contrast to conventional understanding, making everything fun will lead to seeing boring things as unnecessary.

Games are commonly used to motivate pupils, teach skills, and increase pupils' knowledge (Cardoso-Leite & Bavelier, 2014). They can be used as an intervention for pupils, and also to grade and evaluate their progress (Domínguez et al., 2013). Games are related to enjoyment and fun activities; therefore, they are appealing to pupils. They can play with their peers around the world, and practice maths and literacy skills, and they do not realise that they are learning, but everything related to entertainment and leisure can be learnified (Biesta, 2015). The participants in the interviews and questionnaires said that they use games to teach skills, and when they do not have something to do, they fill their lessons with games from educational

websites such as ‘BBC Bitesize’ or ‘Mathletics’. The participants in the current study argued that pupils also need to play traditional games that involve communication and turn-taking, and one teacher claimed that online games do not teach those skills, so for socialising, face-to-face games are essential. The teachers who participated in the current study said that they use games such as Minecraft for educational purposes, but almost all of the participants reported having had problems with non-educational games, because pupils spend too much time on violent and not age-appropriate games, and then they imitate these games at school. Competition draws pupils in, and some participants claimed that these games are addictive for this reason. Some of the teachers, however, said that they use non-educational games such as ‘Fortnite’ to inspire their pupils to write stories. The participants in the questionnaire also argued that games are an effective way of teaching a topic, and there is a common understanding that this can lead to turning almost every activity into a game.

The essential tool in the classroom to achieve all of the things discussed above is the IWB. The participants in the current study claimed that they integrate ICT effectively in their teaching activities because of the affordances for increasing access, visualising for different types of learners, and connecting learning to the online sphere. With an IWB, they use iPads as well to connect and share things interchangeably between screens, and this brings portability and mobility as well. These tools are an intrinsic part of the classroom, and tablets are increasing their role in the classroom (Beauchamp et al., 2015; Lu et al., 2017). Pupils with SEND who have difficulties in writing can use iPads, and one of the participants described how a pupil with autism was obsessed with his writing, so they also used an iPad or a laptop computer. For the participants in the current study, these devices bring flexibility, and pupils can play around with applications and thus improve their skills by practising maths and literacy. The participants said that they like iPads because these devices are collaborative and interactive, and they can monitor what the pupils are doing on these devices. So, there are safety issues around using these devices, which leads the teachers to monitor their pupils.

6.6 ICT for skills development

ICT is used to teach academic and social skills to pupils with and without SEND, and it is used as an educational tool to promote those skills. Technology is used to teach skills effectively in a way that considers all pupils' specific needs. The development of social and academic skills is interlinked in order to thrive in society, therefore a comprehensive approach to preparing pupils in the digital era is what makes effective teaching (Muijs & Reynolds, 2017; Savage & Barnett, 2015). Apps and websites that have been specifically created to support literacy skills are commonly used by teachers, and in the questionnaire, the participants listed their main three online resources, which were mainly related to supporting literacy and maths skills. These websites provide different features such as reading pieces, games, quizzes, videos and writing tasks, therefore these websites are all-inclusive packages for teachers. In the interviews, the participants claimed that these different features support pupils with SEND and behavioural problems, because they can find suitable activities for each pupil's different needs. As discussed in the literature, the internet is a democratic place which gives access to everything, and the participants in the current study demonstrated that they are more inclined toward all-inclusive websites due to the avoidance of misinformation and the quality of content.

The teachers and SENCOs argued that the most effective way of reducing behavioural problems is engaging pupils in educational activities, satisfying their learning needs, and giving them the opportunities to gain a sense of achievement. The sense of achievement and progress has been found to be essential in order to engage users, and ICT companies design their apps so that users can feel that they are progressing and achieving, so that they will continue the task (Alter, 2017). Specific apps for dyslexia, autism and learning difficulties are used to engage pupils in learning, and they provide real time data on a pupil's progress, which makes it easy for teachers to follow their progress. Multimodality and content manipulation are provided with iPads, and pupils can effectively create comics using an iPad. Videos related to stories are found to be more effective than simply reading the story, but

one of the teachers argued that increasing the use of visuals and the language of emojis lead to less reading, and can harm pupils' language development. In line with the literature (Jeong & Hmelo-Silver, 2016; Stenliden et al., 2019), the teachers stated that they tend to use more visuals because they think it is a stimulus, however for the statement about employing multimodal resources when supporting pupils with behavioural problems, the mean score was low. There is a contradiction between the questionnaire's Likert-scale question and open questions and the interviews.

For maths skills, games and apps allow pupils to practice and visualise the abstract concepts of maths, as they can be challenging for pupils to comprehend. The most supportive feature of these online platforms is that they help pupils' visualise abstract concepts, and they can practice these concepts until they learn. Multimodality is commonly used to teach the abstract concepts of science and maths, thus engagement in educational activities is increased (Smith et al., 2005). 'Mathletics' is a very popular platform among the teachers who participated in the questionnaire and interviews, and they said that pupils can practice what they have learned through games and exercises. One of the teachers said that they used Minecraft to teach pupils how to calculate volume using cubes. This demonstrates that online resources are a very intrinsic part of education, and teachers use them as a platform on which pupils can practice through games. As Hirn and Park (2012) discussed, there is a correlation between challenging behaviours and low academic achievement; therefore, as the participants in the current study discussed, helping pupils to thrive academically will reduce their behavioural issues. When pupils are engaged in educational activities and have a sense of achievement, they are less likely to misbehave.

ICT is mostly praised for its ability to help teach metacognition more effectively through project-based activities and real-life simulations such as games (Ott & Pozzi, 2012). It is, however, argued that active learning and whole-class teaching are more effective than individualised learning when it comes to teaching metacognition, because they involve interaction and collaboration (Muijs & Reynolds, 2017). In the questionnaire, the participants were asked whether metacognition and problem-

solving skills can be taught with ICT more effectively, and the mean score was slightly above neutral (.32). There were 57 participants (40.7%) who replied with a neutral answer, so the teachers were not sure about the use of ICT for teaching those skills, although in the literature it is demonstrated that it can be an effective way to teach those skills. However, the younger teachers were more positive towards this statement compared to the older teachers, as the mean score for the older groups was negative. They were positive about the statement that ICT is essential for specialist treatment and support. They were also positive about the statement that ICT supports the academic learning of pupils with behavioural problems, however the number of neutral replies was high (n=35, 25%). As discussed earlier in the chapter, this neutrality is not in line with the positivity towards ICT, so teachers need guidance and a clear theoretical (pedagogical) understanding to achieve effective integration. One of the main findings of this study is that in the questionnaire the number of neutral responses to some of the positive statements about ICT was high, but this could be due to the wording of the statements or the backgrounds of the participants. However, it could also reflect the lack of theoretical understanding, pedagogical clarity, skills and resources.

In the open questions of the questionnaire, one of the participants argued that it is essential to design an ICT-centred curriculum that includes the teaching of problem solving, reasoning and metacognition. Another of the teachers argued that software needs to involve engaging activities, different experiences and supportive assessment methods. In the interviews, the participants argued that they give their pupils problems to solve collaboratively and they search on the internet to come up with solutions. An application called ‘Swift’ is used to teach problem solving, and the interaction is between the software and the pupils. Metacognition is essential to be able to critique the information that they find online, and if they have these skills, they will be able to thrive with these rich resources. One of the teachers who participated in the current study claimed that these skills can be improved only with real life collaboration and interaction between pupils, in order to be really independent. According to Savage and Barnett (2015), not only pupils, but also teachers need to

have metacognitive skills in order to evaluate the available resources needed to be successful constructivist and independent teachers. As Facer (2011) and Kopcha (2012) argued, it is critical for learners in the technological era to have metacognitive and analytical thinking skills, as they themselves need to decide what will be beneficial for them. As the participants from the interviews and the questionnaire discussed, teachers themselves and pupils are alone when they encounter anything on the internet, so these self-regulating skills are important when deciding to go with something or stop doing it.

The common discourse around ICT and the internet is to connect people, and it is seen as a social sphere through which people communicate without limitations (Boyd, 2015; Dijck, 2013). Pupils with behavioural problems mostly have difficulties with social and communication skills, therefore education focuses on improving those skills (Vrasidas, 2015). In the questionnaire, the mean score was positive but low (M=.69) for the statement 'ICT supports positive relationships between pupils SEND and their peers', and the number of neutral replies was high, so there is uncertainty as well. For the statement 'ICT is a negative catalyst for those with behavioural problems', the mean score was -.80, and the number of neutral responses was high (n=42, 30%). There was also a statistically significant difference between those teachers who have worked with pupils with autism and those who have not, as the mean score for the group who have worked with pupils with autism was lower, which shows that they think that pupils with autism have behavioural problems while using ICT. The findings of these statements demonstrate that participants do not see ICT as a cause for misbehaviour when used with pupils with behavioural problems. The qualitative data also reflects the idea that behavioural problems are observed regardless of differences in backgrounds.

Apps help teachers to use social story interventions effectively, as one of the teachers discussed in the interviews. The teachers who participated in the questionnaires and the interviews argued that social skills can be taught most effectively with real life interaction between pupils, but ICT can be used to enhance communication and socialisation, as there are apps that allow pupils to

communicate. One of the teachers, who said that their use of digital tools has a negative impact on their social and communication skills, even stated that there should be an iPad per child. The participants argued that pupils need to be forced to talk with each other, but when pupils use technology, they are lonely and they do not know how to deal with each other anymore, so the participants stated that they see messaging apps and social media as problematic in terms of social and communication skills. In contrast to the literature, as Muijs and Reynolds (2017) discussed how connectivity can enhance communication between peers, the current study has demonstrated that pupils have problems while communicating through the medium of ICT. For pupils with behavioural problems, they engage in group work under the guidance of an adult, and the teachers said that they invite their pupils to reflect on the consequences of an issue or a case scenario, so that they can understand each other. Therefore, direct communication is more effective, because adult guidance is more achievable with direct conversation. It seems that online interaction is unavoidable, so pupils need to have negotiation skills and express themselves without anger on the internet. Visualisation, videos and presentations are applied to demonstrate cases and give real life examples of social issues, and what can be caused by a lack of communication.

6.7 ICT and professional life

The teachers who participated in the current study argued that technology is imperative for the teaching profession, because from communicating with colleagues to finding resources, this is the only place they go. Koh et al. (2017) argued that technological skills are 21st century skills that all teachers must have and must teach their pupils. They argued that education is about teaching those skills, because these are the skills they will need to be part of the future, because the modes of production of knowledge are changing as machines have started to produce and analyse information (Luckin, 2018). The participants in the current study stated that nothing can be done without ICT, therefore the teaching profession is highly digitised. There is a race in terms of integrating ICT, because more things are

transferred to the digital sphere, and with the Covid-19 pandemic, schools are closed and education is online. The participants in this study praised the easiness of cloud computing for planning and sharing resources, and with the increase in visualisation, technology is the main medium for education. However, still there is a lack of understanding of the pedagogical implications of technology, because teachers use technology in minimal ways, although it is claimed that technology will remove all barriers. Personalised education with a constructivist approach is still a dream to be realised, because collaboration is still minimal, and technology brings many new problems, as the participants discussed. For some of the statements in the questionnaire which were about the positive impact of ICT on education, 25% of the responses were neutral, which demonstrates that theoretical understanding needs to be a priority for educators.

In the questionnaire, there were Likert-scale questions about the role of ICT in the teaching profession. The participants strongly agreed with the statement 'I often use ICT for my preparation', and they were also positive about the statement 'When needed I perform internet searches whilst teaching' (M=1.77), but there was a statistically significant difference between the older teachers and the younger teachers, as the older teachers' score was lower. The teachers were positive about the statement 'I often use video resources for my teaching', as the mean score was 2.06. The internet is essential for their profession, as they were positive about the statement 'the internet is my main resource when preparing my teaching.' However, when it comes to homework which requires using ICT or searching the internet, their use of technology is minimal, because the mean score for the statement 'the homework that I give requires searching the internet' was negative. ICT is commonly used by teachers, but they do not use it for homework, although the teachers who participated in the interviews stated that they use online resources such as 'Mathletics' for homework. This data was corroborated in the interviews, because the participants in the current study said that they see ICT as imperative for their profession.

There were two statements in the questionnaire which demonstrate that the teachers do not think they need guidance over integrating ICT. For the statement 'I often need guidance for integrating ICT into teaching', the mean score was negative (M=-.51), and for the statement 'I feel skilled to integrate ICT in my teaching', the mean score was positive (M=1.69). Although in the interviews the participants argued that there is a need for guidance to integrate ICT effectively into their teaching activities, in the questionnaire the participants did not agree with the statement that they need guidance. For example, one of the teachers who participated in the questionnaire argued that they have problems with the availability of vast amounts of information, and she still thinks that there is not enough information. This demonstrates that too much information does not mean enough information, so teachers need help in making sense of the available information. With this increase in information and available tools, the need for guidance is increasing, and this is the case for pupils as well, although it is claimed that with the vastness of information and tools, opportunities are increased. Opportunities and availability do not mean the realisation and appropriation for praxis, although this is the ideology that resonates in the corridors of Silicon Valley (Selwyn, 2018). This is in line with the literature, in which it is stated that there is an inconsistency between what teachers say and what they practice (Mama & Hennessy, 2013), so the theoretical and pedagogical understanding of technology does not extend to teachers. These questions were asked of the teachers to see how they make meaning of ICT, and how they really appropriate it for their profession.

Technology is associated with easiness, as discussed earlier in this chapter, but the teachers also said that they have to keep improving themselves with regards to the available technologies. They said that have taken courses related to the use of educational technology and they follow social media and educational websites which provide information about the practicalities of technology. The main resource for professional development is YouTube, because the participants in the current study stated that they can find videos on any topic, or if they want to do a specific thing in the classroom there is always someone who has already shared a video about it on

YouTube. The teachers argued that there is a lack of guidance, and they look for guidance on the internet, specifically on YouTube and on educational websites. This appears to corroborate the finding of Ertmer et al. (2012) that teachers use social media to improve their skills. As the study by Koh et al. (2017) demonstrated, theoretically deep and pedagogically reflective professional development courses lead to positive changes in teachers' practices. The participants in the current study admitted that they are aware of the lack of theoretical understanding of the pedagogical implications of ICT, so they use YouTube to improve their teaching skills; however, comprehensive courses are needed to lead to changes.

For professional life, the software that follows pupils' development with data gathering is found to be very essential for teachers. The participants in the current study argued that pupils need to be guided, and this guidance can be enhanced with programs that collect data and track pupils' progress. Hamilton and Friesen (2013) also stated that tracking progress is essential in order to improve practice. The participants in the current study said that they believe that progress is most effective with the combination of technology and human power, so teachers cannot be replaced by robots, because ICT is not a magical tool; its potential needs to be realised in the hands of teachers. They argued that these devices lack empathy, and humans are social beings, and education's main concern is to support the social interconnectedness of humans. However, uncertainties about the future can be seen in the data from the questionnaire and the interviews, as the participants said that they see the presence of an adult to guide pupils as a necessity, but their understanding of teaching is that it involves providing access to resources. The current study suggests that teachers need to have a clear understanding of how each device changes their role, as they were invited to reflect on how their role, their classroom and their pedagogy are changing.

Collaboration between teachers and SENCOs is enhanced with technology, as the participants claimed, because they can exchange ideas and communicate easily. They utilise cloud-computing to share files easily, and they access other people's resources via sharing platforms. They use devices that help them connect with each

other, and communicating online is more essential in a time when people need to put distance between each other. Collaboration with parents is also key in supporting pupils' development, and they use communication applications to involve parents. They also have applications that inform parents when an incident is logged, so there is a flow of data to inform educators and parents in real time, as Dijck and Poell (2018) argued, but the flow of data does not necessarily lead to improvements in practices, because teachers need to make meaning of the data pedagogically so that it can inform educational practice. The participants in the current study argued that for effective education there needs to be ongoing communication and data flow in and out of school, and it can only be sustained with the latest technology. Technology is a part of education, but it is not the education itself, so educators need to realise what a highly technologised education means for their role. Technological Pedagogical Content Knowledge (TPACK) theory combines three different areas of knowledge in one dimension, which is the teacher dimension (Phillips, 2016). The aim of TPACK is to provide a comprehensive understanding of technologised learning; however, the current study provides a deeper understanding of the differences between the positive discourse that is created in the corridors of technological companies and educational research, and how the way it is used by teachers can cause a lack of clarity around the role of ICT in education.

6.8 Online resources

Currently, education is semi-online, and with the use of resources, doing activities, and practicing skills over applications, education is highly integrated with technology, but the participants in the current study demonstrated that they act as if technology is an outsider that is applied when it is needed. Applications and websites are commonly used, and are found to be central and essential to the teaching profession, as this study's participants frequently referred to websites. Hall (2015) argued that the information available on the internet is more current and richer because there is a flow of data, so technology is affecting pedagogy with this feature. With the increase in data gathering and data mining technologies, more relevant and

more recently updated information can be brought to the classroom, and the current trend is for datafication, because neoliberal education is obsessed with comparison and competition (Bradbury & Roberts-Holmes, 2017). The websites used frequently by the participants in the current study provide resources and also collect data on pupils' progress in order to increase effectiveness. Therefore, in contrast to the conventional literature, as Bradbury and Roberts-Holmes (2017) discussed the trend for the datafication of education, this study has also demonstrated that educators need to analyse the role of data in education. The multimodal presentation of knowledge and easy access make this very appealing for teachers, so teachers are looking for online platforms that offer everything together, which is very much related to their power of data gathering.

There are also problems around ICT, as infrastructural breakdowns are commonly reported, and these technical problems can cancel or diminish a whole planned lesson. However, the main problem is online safety, because as the teachers in the current study argued, they do not know what will come up on the screen when they search the internet, as discussed above. An increase in the use of online resources has led to an increase in the use of technological devices, and overuse is a big issue for the teachers who participated in the current study, as they stated that pupils come to school tired. Pupils with behavioural problems have issues in controlling the time they spend on these devices, but it is argued that the interest that they have in these devices can be turned into an opportunity (Flewitt et al., 2014). As discussed earlier in the chapter, one of the main issues with pupils with challenging behaviours is how to regulate their use, so instead of considering how pupils' overuse can be turned into an opportunity, the main focus should be on improving the executive function specifically related to ICT. The teachers reported that pupils are over-interested in games, social media and in their little bubbles. Therefore, on the internet, the inherent freedom means not only accessing relevant content, they have access to problematic content as well. Pupils create, recreate, appropriate and publish on the internet, so they are part of the network and they are the constructors and consumers of that content.

The teachers who participated in the current study argued that misinformation increases their workload, because they have to check everything they find on the internet, and in a Likert-scale question, the teachers agreed with the statement 'Information that I find online is not always reliable', so they are aware of the availability of problematic content on the internet. As Selwyn et al. (2010) argued, these issues can impact pupils as well, and they are related to safety issues, which education needs to tackle in order to ensure effective teaching. Human interaction is reducing, and social skills are getting affected, therefore the teachers who participated in the current study suggested using it in a balanced way. However, they also need to reflect how they can tackle online misinformation, fake news, and the problems with user-generated content.

The internet is all about visuals, and after cinema and television, it is part of the last trend of the visualisation of everyday reality (Jeong & Hmelo-Silver, 2016; Stenliden et al., 2019). In the current study (in the interviews and the questionnaire), the participants said that they find visuals very appealing and motivating for pupils, therefore they look for visualised content to help with teaching any subject, which is the reason why the participants said that they find the internet 'very handy'. They repeatedly referred to visualising as the most supportive feature of ICT, therefore it can be claimed that the pedagogy of ICT is visual. It gives them access to visuals that are flooding onto the internet from all around the world, so they can find resources about different parts of the world and very niche topics. In the literature, the trend of visualising educational resources is reflected, and it is linked to the current increase in the consumption of visual content with social media (Jeong & Hmelo-Silver, 2016; Stenliden et al., 2019). This demonstrates that the pedagogy of technology is shaped around the visual culture of the internet, because the teachers repeatedly praised the use of slides, videos, images, animations, memes and graphics. They and their pupils are consumers as well as producers of this culture; therefore, they understand the language of visuals, and pedagogy is becoming a spectacle in which everyone is a presenter and is either watching or being watched.

YouTube is an essential part of this online culture that allows people around the world to share videos about almost anything. This creates problems, as the teachers who participated in the current study argued that teachers have to watch every single video before introducing something to their pupils, or there might be problematic or age-inappropriate advertisements, so they use websites that remove those advertisements. One of the teachers who participated in the current study argued that you can watch 20 million videos before getting something that you want, which means that the time gained by using the internet can be wasted on finding appropriate content. They argued that they would struggle without the internet, but they also said that it needs to be managed, because they can get lost in the search for appropriate content. The internet has its value for teachers, because they have access to many things and because everyone can share things, but they also said that there is a need for gatekeeping. In contrast to the common understanding found in the existing literature, the changing role of the teacher as a facilitator is more related to being a gatekeeper rather than a mentor, as Biesta (2015) discussed in his critical review. The teachers who participated in this study revealed that they are aware of their role as facilitators, but they do not fully embrace it, because they asked for online platforms to be regulated so that their job would be easier. However, when the online sphere is moderated, it is turned into something else, as it becomes an echo chamber of certain ideas, but at the same time without moderation it is getting out of control. There is a paradox of whether the internet is a democratic sphere in which anyone who has the means to participate should participate, or whether there should be more democratic people who need to regulate or watch over the internet. The teachers who participated in the current study need to reflect on the theoretical and pedagogical implications of ICT, which is a sphere that can only survive by being an open platform, therefore teachers need to focus on how to bring relevant resources to pupils. Pupils will interact and collaborate on the internet based on their technical and personal competency.

6.9 Collaboration

Collaboration is a very central theme in technology-based education, and almost all forms of collaboration include technology in some way, whether fully technologically mediated or including computers (Warwick et al., 2011). Interaction is the by-product of technology, and education is transferred to the technological domain in the form of collaboration. As is discussed in the literature, pupils must be engaged in education that can be achieved through the interactive features of technological design as more technological devices are integrated into education (Woo et al., 2011; Warwick et al., 2011). The participants in the current study argued that school is the place where we learn to work together and socialise, but they also said that they think that this can be achieved more effectively through face-to-face interaction. In the questionnaire, the participants were positive about the statement 'ICT promotes collaborative working among pupils', as the mean score was .83, but the score was not very high. The score of the 45-50 age group was negative, whilst the older groups' scores were positive, but lower than that of the younger groups, so these findings do not suggest differences in attitudes in terms of age. This demonstrates that the participants in the current study were not fully convinced that ICT promotes collaborative work, therefore training or guidance is necessary to make teachers more confident about using ICT for collaboration.

The participants said that they think collaboration is essential for managing behaviours, therefore teachers should not be intimidated because of the risk that collaboration involves. As Mercer et al. (2010) suggested, pupils are learning from their significant others. However, Wegerif (2007) claimed that interaction between computers and humans can be more effective, as computers do not get tired, but the current study has demonstrated that teachers give value to human-human interaction with regards to teaching social skills. If there are pupils with SEND or behavioural problems, teachers might avoid using collaboration, as a few of the teachers who participated in the interviews stated that they avoid collaborative activities because it is difficult to monitor every child and some pupils hide in the

group. The participants in both the interviews and the questionnaire suggested using mixed ability groups and that peer supported groups are more effective, but it is important to make sure that pupils change roles and share responsibilities. In line with the findings of Prieto et al. (2011), planning, management and self-regulating, synergy in the group, and real-time feedback can increase the effectiveness of collaboration.

Although there are some pupils who avoid being in the same group as SEND pupils, there are pupils who are more willing to work with those pupils, therefore a teacher can have an impact on pupils' approach to their peers if he or she makes conversation part of the collaborative work. For example, during technology-based practices, tech-savvy pupils do the most work, and collaboration cannot be implemented effectively. Talking partner activities and discussions with peers in which they elaborate on their ideas and defend their position in an argument were commonly referenced by the participants in the current study. Warwick and Kershner (2008) also argued that the dynamic in a group will have a positive impact on the outcome of collaborative work. In line with the literature, the participants in this study also found collaboration to be a very effective way to improve communication and social skills, including learning turn-taking and negotiation.

The teachers who participated in the current study stated that if an activity involves ICT, pupils are more willing to take part, and the user-friendly interface of applications draws pupils into educational activities. The affordances of ICT are the features that draw teachers to use ICT to support pupils, as discussed throughout this study. Self-regulation is essential when it comes to taking ownership of one's learning, as it involves interpersonal regulation and arrangement of social interaction (Jarvela et al., 2015). As discussed earlier, executive function is related to managing pupils' behaviours and controlling their emotions in a social situation. Executive function is essential for collaboration, because collaboration relies on learners' ability to interact and share responsibility. The participants in the current study argued that there are disputes over sharing devices among pupils, which is due to a lack of self-regulation, so there needs to be special activities which are designed to improve the

self-regulating skills of pupils, as its significance is increasing with the prevalence of independent learning, especially during the current pandemic.

The participants in both the questionnaire and the interviews suggested games, coding activities, creating slides and brain-storming ideas (specifically if it includes an iPad) as effective collaborative activities. The most common practices among the teachers who participated in the interviews and the questionnaire are to ask pupils to create slides, make keynote presentations, and create posters or newspapers. One of the original ideas by way of a collaborative activity is that some of the teachers asked their pupils to present a philanthropy project. They used filming and creating videos (i.e. creating trailers using iMovie), and editing with Google Docs with a partner, to avoid behavioural issues and communication breakdowns. McKnight et al. (2016) also found that technology-enhanced collaborative tasks via blogging or discussion boards are used effectively. The teachers suggested that for effective collaboration, timing and planning activities are very significant. One of the teachers also claimed that collaboration can only be between individuals, rather than between individuals and computers.

6.10 ICT in the classroom

A classroom with access to the internet is a connected and enhanced classroom, and teachers are facilitating education so that pupils can construct their learning (Biesta, 2012; Koh et al., 2017). In the classroom, ICT has a central role because of the affordances that have been mentioned in the previous sections. The participants in the questionnaire and interviews gave similar examples involving using smartboards in the classroom. Literacy and numeracy are the main topics that are taught daily, and teachers organise their days around exam subjects. Maths and English are studied every morning, and visuals are used commonly via a smartboard and tablets. They use an iPad that is connected to an Apple TV to provide mobility for the teacher, and the teachers display presentations and visuals on the smartboard. These findings suggest that ICT is very prevalent in the classroom, but because its pedagogical implications are not understood clearly, its pedagogy is not

integrated into the classroom. ICT is integrated in the existing teaching approach into which the current pedagogy fails, and this is the main problem in the educational practice.

It is challenging for schools to cover the curriculum appropriately, as the participants in the current study argued, and it is reported in the literature that schools fail to provide appropriate training for the integration of ICT in the curriculum (Aldunate & Nussbaum, 2013). The participants in the current study also said that they struggle to cover the curriculum because they think it is moving too fast, and they have had to cover more things in recent years and teach coding as part of the new curriculum. The participants claimed that they were, all of a sudden, told to teach coding, but there was a lack of computational skills and instructional guidelines on how do so. The participants in the current study said that they use websites that provide resources for teaching the curriculum, because their schools do not provide robust and clear guidelines. The increase in demand for educational technological platforms could be related to the lack of support and guidance. As the literature suggests, internet-based pedagogy is on the rise, because everything is being transferred to the online sphere, in which the internet becomes the curriculum itself and the teacher is a facilitator (Biesta, 2015).

6.11 Effective teaching

This section of the chapter features the concluding remarks, as all of the aspects are discussed together here under the concept of effective teaching, because there is always a central idea around educational research in terms of what effective teaching is and how education can be structured to teach what it aims to teach (Muijs & Reynolds, 2017). Effective teaching, for example, requires consistency between pedagogical understanding, technology, classroom, teacher, pupils and assessment methods, as Muijs and Reynolds (2017) discussed in their study. This is the case for the education of pupils with SEND and behavioural problems as well. Effective teaching requires pupils to be creative, critical, collaborative, analytical and open-minded, so that they can pursue knowledge and the learning of new skills and

construct their learning. For the participants in the current study, effective teaching is to teach pupils those skills and put pupils in charge of their learning, so that they will then link their learning with their lives and construct their knowledge.

Effective teaching relies on independent learners, and ICT makes pupils independent learners, according to the participants in the current study. Pupils take ownership of their learning because they have access to resources, but technology can increase isolation when it is not used under the guidance of an adult (Bennett & Oliver, 2011), and the participants in the current study said that they have had similar experiences. The emancipatory and independent discourse was prevalent in the questionnaire and interviews, which demonstrates that on the surface they share this understanding, but when they reflect on how they make meaning of the role of ICT, examples of these practices are rare. The availability of good content forces pupils to go beyond their comfort zone and it forces them to expand their zone of proximal development, as they are open to new experiences and knowledge, as the participants in both the questionnaire and the interviews discussed. They stated that they think that pupils interact with their significant others on the internet, and they have access to resources from their zone of proximal development (Mercer et al., 2010). In line with the literature, the teachers who participated in the current study argued that technology helps pupils pitch and pace their learning thanks to the availability of rich content (i.e. colourful images and videos, games, interactive applications), and it attracts their attention (Howard et al., 2016). Educational practices, however, are affected negatively by the lack of clarity around the pedagogical implications of technology, which is not analysed in the literature. For example, educational applications and websites are designed to give control to the learner, and one of the teachers who participated in the current study claimed that they should provide more opportunities for independent learning, as Western culture supports the emancipation of individuals. However, the implications of this emancipation and the independent pedagogy of ICT are not clear, neither in the literature nor in the account of the participants in the current study. For example, one of the teachers claimed that pupils are by themselves in exams, therefore

collaboration should not be used too much, but rather independent learning needs to be applied. However, in the literature it is discussed how the future is based on the skills required to collaborate not only with humans, but also with machines (Luckin, 2018).

A peaceful learning environment that includes respect, calmness, collaboration and care can increase the effectiveness of educational activities. In such an environment, classroom management will be easier and pupils will be more open to collaboration and sharing (Muijs & Reynolds, 2017). The skills that are mentioned in the previous paragraph and the environment of the classroom can teach pupils to be citizens, according to one of the teachers who participated in the current study. They need to be philosophical and thoughtful, so that they do not believe everything they see on the internet, and then they will perform responsible citizenship. The participants in this study, in line with the literature, said that they see a connection between responsible citizenship and so-called digital literacy (D' Agostino et al., 2016). However, the participants claimed that pupils are not critical, so education needs to be organised in order to teach those essential skills.

Engaging and stimulating factors are essential for increasing the effectiveness of teaching, and visuals are found to be particularly engaging and stimulating, according to the participants. Technology generally involves visual aspects, so for teachers using ICT means using visuals (Baker et al., 2018). Some of the teachers said that they think that some of their peers use ICT for the sake of using it, therefore its pedagogical implications need to be thought through. Effective teaching activities are fun activities that pupils enjoy doing; for example, they love competitive activities. They should not be afraid of doing something wrong, and so education is structured as small chunks which they will be willing to do. Telling them off, reducing their confidence, and a lack of behavioural strategies will reduce pupils' participation in educational activities. Playfulness, competition and reward mechanisms reduce education to gamified activities and enjoyment (Manolev et al., 2019; Alter, 2017). However, in the questionnaire and the interviews, the participants claimed that if pupils do not enjoy a task, it is almost impossible to educate them.

The teachers who participated in the current study argued that with the presence of the internet, independent learning requires the ability to analyse and evaluate the facts, rather than learning by heart. Therefore, with the new landscape of education which includes computers and other smart devices, exams also need to be held differently. Instead of evaluating the memorisation of facts, pupils should use computers in exams to analyse facts, build knowledge, and apply it to new situations, as discussed by Beauchamp (2012). Education is more interactive with the use of ICT; therefore, evaluation also needs to include the interaction of pupils with each other and with the software. The participants in the current study said that they believe that ICT allows independent and personalised pedagogy, as the pupils use personal devices. ICT also helps pupils focus on different parts of tasks which can later be shared with each other or on the big screen with the help of applications. The design of the lesson is essential to promoting personalisation, but at the same time collaborative working and ICT allow interaction and collaboration remotely. Therefore, the participants in the current study said that they do not find the independent use of ICT to be against collaborative learning.

The teachers from the questionnaire and the interviews were asked about the educational value of technology, and they subsequently stated that ICT supports the visualisation of content, making it more colourful, rich, and as a result more appealing to pupils. Teachers use visuals frequently (i.e. Microsoft PowerPoint, videos) (Baker et al., 2018), and it is believed that visuals make a good teacher better (Reedy, 2008). The teachers who participated in the current study claimed that visuals are good, but when doing an actual experiment it is difficult and source-wise not applicable. With visualisation tools, education is held like a presentation, and a presentation mind-set involves turning good and effective content into presentations. This means reducing a presentation to a series of bullet points, and it was also discussed by Hammond (2010) that the impact of this presentation and visualisation culture on the pedagogy needs to be analysed. The participants in this study claimed that pupils forget what was at the beginning when they reach the end of a long video; therefore, presentations need to be designed as bite-size learning. The role of ICT is

demonstrating rather than instructing, so the participants said that they find the guidance of an adult teacher vital. A teacher who demonstrates rather than instructs is called a facilitator, as Biesta (2015) argued, so the teachers who participated in the current study see themselves as facilitators, but they do not construct their practices based on emancipating and independent pedagogy. The implications of emancipating and independent pedagogy are not discussed deeply in the literature.

They provide tools and show pupils where to access accurate and supportive resources (i.e. applications, websites), but the rest is on the pupils (Orlando, 2013). For the participants, they support students to construct their learning, therefore their role in their pupils' education is minimal. Education is organised around pupils' needs and the tools to which they have access, so it is supportive to personalise education for pupils with SEND or behavioural problems. However, with such a vast amount of regulated and unregulated content on the internet, the participants emphasised that teaching them analysing and evaluating skills is more significant for their learning. They cannot control their learning in very fine detail, so by teaching them to be able to distinguish valuable resources from 'rubbish', teachers do not have to structure every step.

The constructivist approach sees learning as the product of the mind rather than something observable and subject to the process of stimulus, reward, punishment and reaction (Ferster, 2014). The participants in this study also said that they believe in constructivism, although behaviourism is also prevalent in their teaching approach. Therefore, they believe in improving their skills through projects and problem-based learning, so that they can apply their skills and knowledge to real life problems. They believe in the idea of constructivism, because with the ascendance of technology, the individual is empowered by taking control of his or her whole life, not just by learning (Bauman, 2001). Therefore, all of the participants in this study (in both the questionnaire and the interviews) said that they believe in the idea of constructivism, the empowerment of the individual, and democratising technology and learning tools, which is a neoliberal discourse, as discussed by Han (2017a; 2017b). However, there is an inconsistency between teachers' understanding of the new pedagogy and

their practices, which has minor implications for these practices. The participants in the current study claimed that pupils generally have the necessary skills to use ICT, but they have inequality in accessing those devices. Therefore, giving them access to ICT will solve their educational problems, and they will start learning with these devices. Teachers are positive about the role of ICT, the constructivist approach, and pupils' ability to use ICT, but they still lack the pedagogical understanding to use it for higher-order skills (Ertmer et al., 2013). The current pedagogy in the classroom is a mixture of constructivism and behaviourism, and this is the case for applications that are designed for educational purposes. This mixed pedagogy is not reflected in the literature, as there is a tendency to see the behaviourist approach as a result of teachers' understanding, however, websites, games and applications are designed with a behaviourist mindset, but are presented in an emancipatory and independent constructivist understanding, as Zuboff (2019) argued in her book on surveillance and data extraction.

Planning is significant for effective teaching, but with the increase of this new pedagogical understanding, teachers find the organising of resources to be essential, so planning has a new meaning for teachers, as this study has demonstrated. Facilitating is about organising the vast amount of resources and information so that pupils will be able to manage their learning, rather than lecturing, so teachers will plan their lessons to address the various needs and learning objectives (Kopcha, 2012). The participants said that they find misinformation problematic, therefore they suggest that teaching digital literacy skills is essential. It is also necessary to plan around the fact that not all pupils learn at the same pace, therefore planning improves the experience of pupils with SEND and behavioural problems, because their needs are considered with clear steps. There are websites that help teachers to plan their lessons around the curriculum, and other teachers' plans found on the internet are also used. Planning involves discussing the aspects of effective activities, so that dry and boring lessons can be improved. Planning will remove the need for instant searching on the internet; thus, inappropriate content will be avoided.

As discussed above, the interactive features of ICT allow instant feedback and gratification, which leads to pupils being engaged in their education, so interaction increases the effectiveness of education. Interaction and instant feedback can be achieved by collecting real time data. Data helps to personalise lessons, provide insights into pupils' lives, and optimise teaching methods (Manolev et al., 2019; Dijck & Poell, 2018). The teachers argued that applications provide real time data on the progress of pupils, and they can put in place extra support for the parts with which pupils struggle. This data informs teachers about the learning of each child, but it does not increase effectiveness, as it is the teacher who needs to make use of the data, as one of the teachers claimed. It informs teachers' planning, and one of the teachers claimed that artificial intelligence will increase effectiveness, as it will help to make meaning of real time data. In education, the data is more about tracking progress, increasing interaction, and evaluating engagement and learning. This reflects the current tendency to bring data-tracking technologies into the classroom to provide real-time outcomes for each step and make the impact of every move clearer.

7. Conclusion

The aim of this study was to understand the role of technology and teachers' use of technology in their daily classroom activities, and offer an in-depth and critical look at the role of technology within this context. The rationale for researching the role of ICT was to create a theoretical framework for the effective integration of ICT. This study has demonstrated the interrelatedness of concepts such as technology, pupils, collaboration, classroom and effective teaching, all of which were found to be valuable when it comes to understanding educational practices. Therefore, technology, pedagogy and pupils with behavioural problems were problematised to go beyond the common understanding of education. In the literature review, it was demonstrated that technology is ubiquitous, and it is an intrinsic part of education that pedagogy is changing when each new technological device is introduced. The integration of ICT is an ongoing process that requires teachers to make decisions on the impact of each new device, thus this study has helped to analyse the role of ICT to provide a deeper understanding of the complexity of decision-making as well as the complexity of integrating ICT into educational practices.

Different types of datasets were used to provide different angles of the phenomenon, as with the questionnaire the general scene was described in terms of the role of ICT in the classroom, and in the interviews the participants were asked how they construct their understanding of the role of ICT in education. In the questionnaire, the teachers were asked to rate the importance of technological devices for their learning, and there were also open questions related to the use of ICT for supporting pupils with behavioural problems, and their academic and social skills development. There were sections in the questionnaire that included Likert-scale questions about the use of ICT for supporting pupils and for creating educational activities. The interview questions were also focused on these matters, and this led to themes like the use of ICT for learning, the affordances of ICT, the use of online resources, its applications for supporting specific skills, and its role in promoting effective teaching and engagement.

The questionnaire featured Likert-scale questions related to the role of ICT in supporting pupils with SEND and behavioural problems. In the questionnaire and the interviews, there were questions such as ‘Can you reflect on your school's ethos and policy in terms of strategies and experiences toward the education of pupils with behavioural problems?’, which are related to the research questions. Different sets of data were gathered to carry out a comprehensive analysis of the use of ICT in the classroom in relation to supporting pupils with SEND and specifically with behavioural problems. These questions focused on the impact of ICT on pupils’ engagement, collaboration, and learning of essential skills, as well as classroom management, resourcing, and the multimodality approach to learning.

After the general understanding of educational technology was researched, the participants were asked to reflect on the interrelatedness of all of the aspects that were investigated in this study. Thus, this study’s contribution is to create a comprehensive picture of the role of ICT for supporting pupils with behavioural problems in relation to technology’s affordances, the pedagogical implications of technology, collaborative learning, and effective teaching. First of all, teachers are aware of the need to self-regulate when it comes to getting the most out of ICT-based education, and they are aware that pupils with behavioural problems have more difficulties in self-regulating their learning. When designing an app or activity, or planning a lesson, the problem with self-regulating needs to be considered, but technological devices can distract pupils because they can switch to an app that they want to use. Technology itself is found engaging and motivating by teachers, but they can easily go off-task due to the access to a plethora of websites, games and applications. One of the main conclusions of this study is that increased access without self-regulation skills can create misuse and cause management skills.

The teachers said that they see behavioural problems as related to management and relationship issues, and with the help of technology, an inclusive approach can reduce behavioural issues by giving every pupil a chance to thrive in society and reach their potential, because when needs are not met, it leads to exclusion. The participants argued the importance of having a clear behavioural policy and being

aware of the underlying causes of behaviour, which requires a fully inclusive understanding of education. Otherwise, educators can easily give up on supporting pupils, but technology can help to personalise teaching by providing resources that appeal to pupils' different needs. For personalisation, the ability to self-regulate was stated by the teachers to be essential, but they did not provide any examples of how technology can help pupils to improve their executive function. This study has demonstrated that adult guidance is a necessity when it comes to behavioural problems, because of the problems in executive function (i.e. self-regulation).

There was no dispute among the participants that ICT devices engage pupils and increase participation, but they did not give examples of how pupils' learning is improved, they only highlighted the excitement towards these devices. The participants also claimed that ICT leads to isolation and a decrease in face-to-face interaction. The main contribution of this study is that in the questionnaire there were questions about positivity, such as whether it supports diversifying education, positive relationships, teaching academic skills, personalisation, and multimodality. However, the number of 'neither agree nor disagree' answers was high for many of the questions, which demonstrates that either the teachers avoided providing responses to such statements, or they are not sure about the role of ICT in their teaching. In both situations, although they use ICT frequently, they do not position ICT as a tool for personalisation in their consciousness and understanding, because ICT still is seen as an outsider, although it has a very central role in their educational practice. ICT is seen as essential when it comes to supporting pupils with SEND and behavioural problems, because it provides the necessary tools, applications and resources for learning, thus all pupils will be connected to their learning and to the world. However, off-task behaviours during ICT-based activities are common and distract pupils from their education, because when a connection is granted it connects to everything, so pupils need to be resilient to avoid looking at inappropriate things. The participants in the study argued that pupils with challenging behaviours lack those skills, as they look at inappropriate things more often compared to their typical peers.

Moreover, although there is a difference in terms of positivity towards ICT among the younger and older teachers, their practices do not differ, and they support the idea of making pupils more active in learning. Both groups use ICT to present their lessons, create colourful content, and allow pupils to search on the internet, but younger teachers are more inclined towards the emancipatory and independent constructivist approach, because they use ICT in more flexible ways. A limited understanding can be seen from both sides, because the educational community does not reflect on the discourse from the technological companies that ICT is emancipatory. Moreover, the impact of behaviourism in the designing of technology is more significant than that of constructivism. This is not in line with the discourse of the total emancipation of pupils from teachers and institutions, which holds that pupils use technology to find resources, learn at their own pace and in their own time, share and collaborate with others, and express themselves freely (Biesta, 2015; Selwyn, 2015). The teachers in general argued that pupils need to have skills to search, evaluate and analyse knowledge on the internet in order to be able thrive in the future.

The teachers also argued that ICT helps design bite-size learning, and pupils with different skills can learn at their own pace with bite-sized learning. This demonstrates that the pedagogy of ICT is a design-based, bite-sized and multimodal approach, and these affordances of ICT were praised by all of the interview participants. ICT also supports interaction and collaboration; thus, pupils can learn from each other with the supportive pedagogical features of ICT. This is the definition of effective teaching for teachers, and the use of ICT is equal to effective teaching for the participants. However, collaboration is limited to creating posters and slides, and also there is limited practice of collaboration between pupils with and without behavioural problems. Games are common educational practices, and teachers use them for collaboration.

Easiness, speed, connectivity, flexibility, multimodality, interactivity, remote control, distant presentations, and the feeling of newness are features that draw teachers into using ICT, and with the opportunities which are created by ICT, teachers and schools feel that it is an obligation to use ICT. Easiness is the combination of all of

these features, because when everything comes together it is easier to use ICT, so teachers are looking for all-in-one packages. Technology means state-of-the-art devices that give the feeling of newness and modernity, but it can provide these feelings by combining all of the features that have been mentioned. Educators are looking for colourful but meaningful and appropriate content, and they prefer platforms that increase engagement, interaction and collaboration, as the participants said that they see the role of ICT as providing these features all together. However, having access to these features has not led to effective educational practices, because the teachers admitted that they have difficulties designing their lessons to make the most of these features, and there are no examples of project-based or problem-based student-centred activities. This study has demonstrated that the tendency is towards the mobility that leads education into the use of mobile devices and sets education free of the boundaries of time and space.

Effective teaching can be achieved when all of the components, which are pupils, teachers, pedagogy, classroom school management, technology and curriculum, work in harmony. In this study, it has been demonstrated that the teachers' understanding of effective teaching is engaging pupils in educational activities which include visual-based stimuli. This understanding of the ICT-based pedagogy is due to a lack of guidance and clarity when integrating ICT in their pedagogy, because the existing research has only been focused on how teachers and pupils find technology innovative and engaging, but there is limited guidance on effective integration. Having one component, for example ICT devices, does not ensure the existence of effective educational practices, either for pupils with or without behavioural problems.

Gamification is very central in the teachers' understanding, because the teachers made reference repeatedly to playfulness, competition and reward mechanisms, and these features are intrinsic parts of ICT. This study has demonstrated that for teachers, the pedagogical understanding of ICT is gamification, because they see it as engaging and motivating. However, by using these features, the aim and central focus has become competition, and pupils stop giving value to things when they are

not part of the reward mechanism, and some participants described having had this experience with their pupils. This shows the prevalence of the behaviourist understanding of education, thus this study has demonstrated that the current educational understanding is a mixture of the constructivist and behaviourist approaches. However, the constructivist approach is used in the discourse of empowering the individual and personalising learning, but these applications and games are designed around a behaviourist approach.

The current understanding of education, which is highly technologised, requires independent learners to guide their learning and construct their knowledge effectively. Applications and websites are designed for pupils to pace and pitch their learning around bite-size learning that is sensitive to different needs. It has been discussed through this study that technology-based education can be effective in this understanding, but as the participants discussed, it can only be effective with the guidance of an adult. Guidance is more than facilitation, because facilitation instrumentalises teachers, but teachers can be effective as role models and knowledgeable others who are an essential part of learning. This guidance is more vital for pupils with SEND, specifically behavioural problems, as they have difficulties in self-regulating their learning. As the teachers discussed, misinformation is increasing, and finding appropriate resources is difficult. A teacher's role is not only directing pupils to supportive educational websites, but also performing a gate-keeper role, because the outside is becoming a dangerous place. This outside is the internet, and it is inside of the classroom and the pupils' homes, so the distinction between outside and inside is disappearing in the reality of everyday life.

The participants showed that they hold constructivist ideas, such as the notion that pupils need to direct their learning and construct their knowledge, and this approach has become a necessity with the ascendance of technology. With datafication, pupils' learning and their interaction during activities can be tracked, and based on that the data can be personalised easily, as has been claimed widely. With the increase in the power of machines, such as data gathering, mining and analytics, personalisation, constructivism and the emancipation of individuals have become the

ideology of technological companies. The participants, therefore, made reference to this ideology when they spoke about the role of ICT in their teaching, but when they provided details about how they integrate ICT into their teaching, a behaviourist approach was found to be prevalent in the design of their lessons that involve applications and tools. The connectivity of the internet brings access to problematic content as well, and there has been an increase in the rise of inappropriate content, so publicising the idea of technology as an ultimate tool for learning is getting harder.

There is also the problem of ongoing development in the field of ICT, so it is difficult for teachers to update themselves, and there is always the sense of falling behind with new developments. Some schools even have difficulties in providing an iPad per child and other basic technological infrastructure, so there is an inequality in access to technology. This leads to a lack of evidence-based practice of ICT tools and applications and a lack of expertise in using new devices in an educationally supportive way. The struggle to integrate ICT into educational practice has made schools obsolete, and there are institutions that need to be transformed, if not removed, because technology is a necessity for teachers. There was a dispute over the statement that education is reliant on ICT, but the participants' accounts of their practices and the role of ICT for teaching have demonstrated that ICT is an intrinsic part of pedagogy, and it is hard to teach without ICT. The future of education will be strongly ICT-based, and the teachers stated that they think they need more ICT, because it is almost impossible to do any profession in the world nowadays without ICT. It could even lead to the replacement of teachers with robots, because robots can project videos onto a wall and interact with pupils via AI, as one of the teachers discussed. This demonstrates that there is a very mechanical understanding of teaching, since a teacher can be replaced with a machine that can show videos and interact with pupils. The liquidity of the very nature of education and educational praxis is very much in line with Bauman's (2013) notion of 'liquid modernity', as the role of teacher is continually reshaped, and key established functions are often replaced by or delegated to technology.

The teachers said that they use YouTube frequently for finding resources and learning new skills or information, but they argued that inappropriate content and advertisements can cause problems when they use YouTube for educational purposes. This raises the issue of safety on the internet, where bullying and misinformation are common problems. Teachers need to safeguard and perform the role of gatekeeping to protect pupils from online harm, and for teachers this is additional work. Pupils need to be resilient with regards to online issues, so the curriculum needs to be designed to teach those skills, but it needs to go beyond so-called digital literacy, because although these problems are increasing, pupils do not have the skills to be resilient, although they have had digital literacy education for some time. ICT is highly integrated into education, and the teachers argued that websites such as YouTube need to be regulated, but it needs to be considered that some issues are intrinsic to ICT as well, for example misinformation or inappropriate content, because YouTube is what it is because it provides a platform for things that are considered ridiculous as well. When a problem is removed, for example access and connectivity issues, more problems are created, because it gives access to everyone, so when enjoying the possibility of finding anything on YouTube or the internet, this involves problematic content as well. Also, another issue with having access to everything, as the participants stated, is the vastness of information available online, so valuable content can get lost in this vastness, and this is why teachers are looking for platforms that provide appropriate educational content. Education, therefore, needs to go beyond the idea of a regulated place, whilst also being critical of the common educational philosophy around technologised education. These issues of appropriate content and regulation are more essential for pupils with challenging behaviours.

Using technology as a reward itself, or the tendency to find a way to teach everything through games, has been shown to be the pedagogical understanding of the participants when it comes to motivating and engaging pupils by using games in education. However, one teacher criticised the fact that using technology as bribery or a bargaining tool is turning education into a motivation endeavour. The tendency

to use entertaining activities to be able to get pupils interested and then motivated and then engaged in educational activities has led to an increase in the idea of education as entertainment. Motivation and engagement have become very common notions of education, such that pedagogy has become equal to engagement, and this pedagogical vision falls under the impact of behaviourism, because of the idea of stimulus and response. The edutainment phenomenon that has been discussed in this study explains the rise of behaviourist and gamified design in educational technology. However, distraction is also increasing, because technological devices bring access to many things, not only educational content. The issue around self-regulation for pupils with behavioural problems requires teachers to consider their specific needs and have special interventions for these groups. The behaviourist reward and motivation mechanism is not the only solution to the issue of self-regulation.

ICT and applications are essential for teaching social, academic and communication skills for pupils with and without SEND, because of the affordance of ICT that pupils have access to colourful content and interactive applications. There are many websites and applications that provide resources specifically for literacy, maths, science, history, geography and extracurricular activities. ICT is used in a limited way to support metacognitive and problem-solving skills, and teachers lack the knowledge and pedagogical understanding required to teach these skills. They need to get support to design a curriculum to teach those skills effectively, because they argue that they have difficulties in using ICT to find resources and teach those skills. There are also issues around infrastructure, schools' ethos and a shortage of staff; for example, in some classrooms there are pupils with challenging behaviours, but a TA is not available. Moreover, teaching these skills requires an established school system that is equipped with enough technology and trained staff, including TAs. Therefore, the training and educational frameworks need to address the link between applications, the pedagogical implications of each device, and how knowledge can be constructed through those devices and their pedagogy.

ICT has become imperative for the teaching profession because more things are being transferred to the online sphere, as with the Covid-19 pandemic many schools were closed, and education moved fully online. Although the teachers said that they do not agree that they need guidance on integrating ICT, this study has demonstrated that teachers need pedagogical and practical guidance on the effective use of ICT. Also, the teachers said that they do not give homework that requires searching on the internet or using ICT, although they believe that pupils need to learn ICT skills in order to survive in the future. Therefore, without ICT-based homework, pupils will not be fully independent learners who can improve their skills based on their needs. With the current distance learning phenomenon due to Covid-19, pupils are developing their self-regulating skills to continue their education with the help of their parents, if it is available. ICT-based homework is necessary to educate pupils in terms of these self-regulating skills for similar situations in the future.

ICT is the future of education, and remote learning platforms will get more attention, therefore considering the problems around ICT-based education that have been discussed throughout this chapter is essential for the future of education. Collaboration is very minimal during ICT-based activities, and the claim in the literature that ICT is where collaboration will thrive is not reflected in schools. Technology has not removed all barriers, because there are still schools, teachers and pupils that have difficulties in accessing technology, although it is imperative for education. Effective teaching is the combination of a clear pedagogy, supportive technological infrastructure, positive inclusive school ethos, guided teachers, and a classroom environment that is sensitive to individual needs. The trend for the deinstitutionalisation of education will create different settings in which pupils are left on their own to guide their learning, but schools are accepted as the best places to learn how to socialise and integrate into society.

7.1.1 Limitations

Schools from various different socio-economic areas were invited, but schools that are highly technologised did not accept the invitation to be involved in the interviews, and the participant schools were from lower socio-economic areas of London. In the questionnaire, there were schools from diverse areas from all over the UK, mainly England, therefore it can be accepted that this represents the general situation in schools. However, the diversity in regions does not lead to representation of the population, because there is diversity in practices, and there are schools which have different experiences of the use of ICT. A larger sample would increase the validity and reliability of the survey, but participation was limited, although many schools from around the UK were invited to take part. Therefore, thinking about the unwillingness of teachers to participate, the number of participants can be considered as an achievement for what the study aimed to achieve.

Observations would enhance the triangulation with additional sets of data, but the data would be unmanageable, as a few observations were made during school trips. Interviewing pupils would also provide an insight into their understanding of education and technology, as the aim is to support their learning, but it was difficult to obtain their consent, so this was also unmanageable due to time constraints.

Another limitation is that comparing the practices of schools who have highly technology-based educational infrastructure and the schools that participated would have enhanced how their practices differ in accordance of pedagogical understanding and technical background. There are schools with highly integrated ICT, therefore their practices might differ, and there is a need to analyse their understanding of how ICT shapes their pedagogy and their decision-making process during their educational practice.

The participants had time limits, so during the interviews it seemed that they were not concentrating enough on the questions, which might have had an impact on the findings of the study. However, some of the participants were still willing to

contribute, and generally the interviews lasted for at least an hour. Half of the participants in the questionnaire did not provide responses to the open questions, which suggests that they lacked the time to reflect on the questions.

Another time related limitation is that the participants stated that they would prefer more support from a TA, because they have pupils with SEND who have not been diagnosed. If they had a TA, it might have an impact on their practice, and they might have a different opinion on the impact of technology on their practice. Teachers and pupils who have challenges such as a lack of time, support, budget and understanding of the pedagogical implications of ICT would probably have more issues around using ICT. Removing these barriers would bring in different results, and probably different points for reflection.

7.1.2 Implications and recommendations

The findings of this study demonstrate that there is a lack of clarity on the real impact of technology on pedagogy, as teachers' perceptions and daily experiences are not always in sync with what software and hardware manufacturers claim when promoting their products. For the academic community, there is an urgent need to distance themselves from the emancipatory and independent discourse and investigate the prevalence of behaviourism around educational technology. Teachers use ICT as a reward, stimulus and motivation to engage pupils in educational activities, while they share the ideas of an emancipatory pedagogy which has limited implications in practice. ICT is already a big part of education, and with Covid-19 there will be an increase in the transformation of education, so there is a need to research online learning, and how collaborative ICT is. The role of this research is to provide an insight into the everyday reality of how people are using technology to manage their lives and their learning.

For practitioners, they need to reflect on their understanding of technology, as there are inconsistencies between what they say and what they practice. This is because they do not challenge themselves with regards to innovation, because there is

confusion in the research community as well. Technology has long been praised as a way to innovate pedagogy, but it is rather a transformation, the impact of which is not clear in terms of empowering the individual with increased access. The teachers who participated in the questionnaire and interviews stated that they do not follow evidence-based research, so the research needs to inform the practice, and teachers need to follow the new research on technology. Academic community, therefore, needs to find ways to share their research with teachers in order to have a real-life impact on. Teachers need to collaborate with each other so that they can go beyond the positive discourse and improve their real-life practice accordingly. They even need to have a more comprehensive understanding of evidence-based and theoretically guided ICT-based practice, and be reflective on the process in order to be able to provide effective teaching for pupils with SEND, specifically challenging behaviours.

Schools need to provide guidance to teachers, because a significant number of the questionnaire participants provided a neutral response to the statement that there is a lack of understanding and guidance. It is also mentioned in the previous paragraph that teachers in general do not follow evidence-based research, so schools need to have a duty to create opportunities for discussion and collaboration among teachers for their ongoing development. Following the changing landscape of education is not only a necessity for teachers, it is also a necessity for schools, otherwise, as has been discussed in this thesis, schools will become zombie institutions. As Ulrich Beck discussed, they are transformed through modernisation, but they are still alive with regards to some traditional aspects. Schools are increasingly becoming zombie institutions in these fast-changing times in which it is difficult to follow ongoing developments with limited budgets and time. Schools need to hold a discussion around each new device before using it, which will lead to a clear understanding of the pedagogical implications of any new devices for any pupils with different needs.

Schools and local authorities need to provide TAs if there are pupils with challenging behavioural problems, even if they have not officially been diagnosed. Providing a TA will improve a teacher's classroom management, pedagogical practices and

understanding of special needs, otherwise the classroom will be unmanageable with a huge workload. It seems that with the complexity of integrating ICT effectively and finding appropriate strategies for each child, it makes the support of a TA a necessity for each classroom. TAs themselves also need to improve their pedagogical skills to improve educational practices in the classroom and be able to go beyond the positive discourse of ICT, so that they can create the real-life impact of collaborative, creative, personalised, and project-based learning.

There is a need to observe classrooms to analyse educational praxis, because seeing ICT when it is being used would enhance the understanding of the role of ICT in supporting pupils. The next phase will be cross-referencing the findings with observations in schools that are using technology in technologically enhanced classrooms, in order to compare different practices. It is essential to analyse the discourse around ICT in schools that integrate ICT fully in their classrooms in line with whether the so-called potential of ICT is being realised. Also, if there is a difference between the pedagogies of schools from low and high socio-economic backgrounds, this will increase the understanding of cultural impact, the impact of tools, and the interrelatedness of the culture of tools and the use of tools. In this study the impact of social context on pedagogical understanding has been discussed, because human beings construct their understanding of tools and utilise tools or realise potential in line with their needs (i.e. through the appropriation of a device). Thus, it is essential to analyse the differences in understanding in different countries, therefore similar research will be carried out in Turkey as a field of study in order to compare different circumstances, cultural understandings and pedagogical implications.

With the Covid-19 pandemic, this study showed that schools struggle in distance learning, thus creating a fully motivated technological programme based on the needs of the educational community is a necessity to improve the quality of education. Experimenting with the current situation, and schools without walls (schools using cloud computing) and seeing how it works can help to enhance our understanding of online education. These will add to our understanding of the

pedagogical implications of technology, for example how an educationally driven endeavour could change the result of the experiment. Here, the experience of pupils is really important, as in the new environment they are in charge of their learning, which reflects the reality more than in the past. It will directly be linked to how they self-regulate their learning when they are alone with their devices. The current study has set a foundation for the understanding of technology-based learning, and it is necessary to consider the current situation, which is that schools are now thinking about blended learning, if not online distance learning.

To dig deeper into the role of ICT in pupils' lives, long-term ethnographic research is necessary to be able to analyse the decision-making processes of pupils while they manage their time when using ICT for leisure and education. This will help to provide an insight into the concept of multi-tasking, which is seen as a feature of the so-called 'digital native', because ICT is a big part of their lives. Understanding how pupils will regulate their lives and education when schools are deinstitutionalised and transferred to cloud computing can be achieved with ethnographic research. This study has provided a sufficient basis for such ethnographic research which would highlight the impact of ICT on the everyday lives of pupils. Most importantly, however, any further research needs to involve pupils with autism, ADHD and EBD, to see how they self-regulate their learning, as with individualised learning, self-regulating has become essential for every pupil.

To conclude, the current study's contribution to knowledge is the further development of our understanding that the integration of ICT is an ongoing process that requires teachers to make decisions on the impact of new technologies. Participants' educational practice is not always informed by evidence-based research, so there should be more training and skill-based courses around the pedagogy of ICT. The lack of evidence-based and research informed practice leads to uncertainty regarding teachers' roles within every changing technology mediated educational plateau, regardless of their formative and vocational training trajectories. Teachers' collaborative practices are often limited to the production of supportive materials (e.g. slides or posters), so teachers are often challenged using ICT for the

development of metacognitive skills and project-based or problem-based learning. When it comes to pupils with challenging behaviours, teachers see ICT as a motivational tool, but they also report problematic behaviours such as overuse, bullying and drifting off-task. This study also shows that self-regulating skills —a part of executive function—training need to be developed further, given the time that students spend on their own using technology. Students' self-regulating skills should not be taken for granted because education is a collaborative endeavour. Most significantly, this work shows that although there is constructivist discourse around education, teachers' praxis reflects behaviourist understanding of gamified technology.

Another contribution of the current study is the provision of systematically acquired evidence that wider educational communities are significant in supporting teachers during decision-making, particularly when they integrate novel tools into their practice. Teachers' positivity towards ICT is not reflected in their practice and it is not only due to lack of knowledge, skills and infrastructure, but also due to limited access to useful resources and examples of effective use of ICT. Effective teaching requires trained teachers to have access to sufficient resources. The widely reported challenges that teachers have been facing during the Covid-19 pandemic should be heard as an important alarm-bell about technological infrastructures for effective learning are both insufficient but, most importantly, unequally and inequitably distributed.

8. References

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9. Appendices

9.1 List of online educational websites and their purposes

Twinkl: Creates educational resources and they are created by teachers > twinkl.com

YouTube: A website that people upload videos > youtube.com

TES: A website which creates online resources for educators > tes.com

BBC: British Broadcasting Corporation produces educational content for different purposes > bbc.co.uk/bitesize

Testbase: Provides assessment tools for primary schools > testbase.co.uk

Mathletics: It is an online math program that provides fun math activities like games > mathletics.com

Pruplemash: It is an online platform provides resources for computing curriculum > purplemash.com

Primaryresources: It provides worksheets, lesson plans and teaching ideas for primary school teachers > primaryresources.co.uk

Discovery Education Espresso: It provides full resources for all subjects > https://www.discoveryeducation.co.uk/what-we-offer/discovery-education-espresso/new-resources

Out of the Ark: It provides primary school songs >outoftheark.co.uk

Hit the button: interactive math game > topmarks.co.uk

Oddizzi: geography resources for primary schools > oddizzi.com

Scarf: Developed by teachers and centred on a values-based growth mindset approach > https://www.coramlifeeducation.org.uk/scarf/

Garyhall: Primary maths resources > https://garyhall.org.uk/primary-maths-resources.php

Marvellous me: It provides resources for homework > https://marvellousme.com

Cornerstones: Online resources for the curriculum > https://cornerstoneseducation.co.uk

Read theory: online resources for reading > https://readtheory.org

Timetables rock stars: It provides online resource to teach time tables in fun way > https://ttrockstars.com

Classroom monitor: live assessment tracking data > https://www.classroommonitor.co.uk

Education city: It provides educational software for schools and homework > https://www.edmentuminternational.com

Mymaths: It provides online resources for maths > https://www.mymaths.co.uk

Nrich: mathmetics resources for teachers, children and parents > https://nrich.maths.org

Kahoot: a game-based learning platform > https://kahoot.com

Prodigy: games for maths learning in classroom and home > https://www.prodigygame.com/main-en/

Plickers: card activity to play in the classroom > https://get.plickers.com

Oxford owl: resources such eBooks for literacy > https://www.oxfordowl.co.uk

White rose maths: resources for maths > https://whiterosemaths.com

Literacy shed: it provides visual literacy > https://www.literacyshed.com/home.html

NCETM: the national centre for excellence in the teaching of mathematics > https://www.ncetm.org.uk

ClassDojo: it is a communication and monitoring software for schools > https://www.classdojo.com

Spellodrome: it provides resources for spelling > https://www.spellodrome.com/#/home

OTrack: assessment tracking software > https://www.optimumotrack.co.uk

Reading eggs: it provides resources for reading such as phonics games > https://readingeggs.co.uk

Quizlet: learning sciences via games and learning activities > https://quizlet.com/en-gb

Bug club: an online resource for reading > https://www.activelearnprimary.co.uk/login?c=0

Vocabulary ninja: resources for vocabulary > https://vocabularyninja.co.uk

Jamboard: it is an interactive whiteboard system developed by google > jamboard.google.com

Khan's Academy: online videos for teaching sciences and other subjects > https://www.khanacademy.org

Charanga: resources for music education > https://charanga.com/site/

Classroom secrets: it provides resources for different subjects > https://classroomsecrets.co.uk

9.2 Participant information sheet

Participant Information Sheet For [*target group*]

UCL Research Ethics Committee Approval ID Number:

YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Title of Study: The use of ICT in supporting the academic and social development of pupils with educational behavioural problems within inclusive KS2 classrooms

Department: UCL – IOE, Culture, Communication and Media

Name and Contact Details of the Researcher: Abdullah Ciftci (abdullah.ciftci.15@ucl.ac.uk)

Name and Contact Details of the Principal Supervisor: Dr Evangelos Himonides, UCL Institute or Education, University College London, UK Email: e.himonides@ucl.ac.uk, Tel: +442076126599

Name and Contact Details of the UCL Data Protection Officer: data-protection@ucl.ac.uk

You are being invited to take part in a research project. Before you decided, it is important for you to understand why the research is being done and what it involves. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear of if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

I am a doctoral research student at University College London, supervised by Dr Evangelos Himonides (Reader in Technology, Education, and Music). In my research project, I will analyse the use of ICT in primary classrooms for development and attainment of pupils with behavioural problems by asking teachers how they use ICT, why they use ICT and what kind of ICT they use in their classroom. The information that you will provide will help us to understand classroom activities and the impact of ICT on students with behavioural problems.

The research invites teachers and SENCOs in KS-2 to participate interviews/focus group discussions. I am looking for teachers who can offer details about their use of ICT in their classroom as well as teaching and learning activities that take place in their classrooms. I am not aiming to change what or how the teachers choose to teach, and will not be making any judgements about teaching. My research focus is on the impact of ICT on learning, teaching and behaviours of pupils with SEND. By participating in the research, you would contribute to a project that will deepen our understanding of classroom use of ICT, learning of pupils with SEND and so contribute towards developing ways of improving teaching and learning practices and attainment of pupils with SEND in the future.

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. You can withdraw any time without giving a reason. If you decide to withdraw you will be asked what you wish to happen to the data you have provided up to that point.

You will be interviewed which will last approximately one hour [for focus group discussion it will last approximately 2 hours and you will discuss with your 3 colleagues]. The place for interview [or focus group discussion] will be discussed with you to be able to conduct the research in most comfortable place for you. The place in mind for interview is your school environment as it will be discussed with the head teacher. The interview [or discussion] will be recorded (sound only) using a small solid state digital voice recorder.

The audio and transcripts of the audio will be used only for analysis and for illustration in conference presentations and lectures. No other use will be made of them without your written permission, and no one outside the project will be allowed access to the original recordings.

University College London has strict ethical procedures on conducting ethical research with teachers, consistent with current British Educational Research Association guidelines. During the project if you feel the need to complain about the process you can contact with my supervisor or the Chair of the UCL Research Ethics Committee – ethics@ucl.ac.uk. Also, the data controller of this project will be University College London (UCL), for processing of personal data and any problems about data protection, UCL can be contacted at data-protection@ucl.ac.uk.

All participants, teachers, SENCOs and the school would be made anonymous in all research reports. The data collected will be kept strictly confidential, available only to my supervisor and

myself, and not used other than specified without the further consent of all involved being obtained. Audio record and transcriptions of interviews and focus group discussions will be kept in an encrypted computer. I have enhanced DBS disclosure from 16 February 2017, but it could be renewed if you felt it appropriate.

If you feel you would like to take part in the study, or need more information about what is involved, please contact me at abdullah.ciftci.15@ucl.ac.uk.

Also I would like to remind you that a copy of this information sheet will be given to you.

Thank you for reading this information sheet and for considering to take part in this research study.

9.3 The questionnaire

The questionnaire can be accessed via this link:

https://forms.gle/bsK6dz7jCvmRwANH9

9.4 interview questions

What does a usual day in the classroom look like?

What kind of internet based resources do you use?

How do you use ICT and online resources?

How does having access to the internet in the classroom affect teaching and learning?

Why do you use ICT and online resource for teaching?

How do you perceive ICT in your professional life in terms teaching and pupils' learning?

What do you think about the ongoing development in the field of ICT?

In terms of the current role of educational technology, do you think education is reliant on ICT?

What is effective teaching practice for you?

What impact it has on the development of problem solving, analytical thinking and metacognition?

How can a student-centred approach be employed effectively with ICT?

How do you integrate ICT in your practice?

What should be considered when planning ICT-based activities in terms of effective teaching practices?

What is impact of ICT on pupils' behaviour?

What is the role of ICT in the education of pupils with SEND, specifically behavioural problems?

How do you use ICT to support pupils with behavioural problems' learning?

How can collaboration be promoted among pupils with and without behavioural problems?