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University
of Glasgow

**Investigating the effects of teacher leadership on the digital
technology competence of teachers in a Scottish primary school**

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Dissertation submitted by Jonathan Hull BA (Hons), PGDE, in partial fulfilment of the requirements for the degree of Master of Education.

University of Glasgow
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Abstract

This extended research proposal dissertation aims to focus on and examine the position of teacher leadership within a local authority in Scotland, and more specifically the role and impact of teacher leadership on the use of digital technology in learning and teaching activities. It will also take in to account the recent global coronavirus pandemic, which has served to magnify the importance of digital technologies in learning and teaching activities. The study gains its significance from the importance the Scottish Government has placed on the use of digital technologies in schools for learning and teaching activities through the publication of its strategy concerning the effective use of digital technology in schools, as well as the need for all schools to move to an online and remote method of delivery of learning activities during the recent global coronavirus pandemic.

The extended research proposal plans to focus on one school and will use a mixed-methods research approach to acquire data around the digital technology competence of teachers. In stage one, qualitative data will take the form of face-to-face interviews, participant observation sessions and field notes in a learning journal. Quantitative data will be gleaned from digital technology usage statistics taken from two online administration consoles. During stage two, interventions will then take place to include digital learning training sessions, team-teaching learning experiences and individual coaching sessions to increase teacher competence and confidence in using digital technology for learning and teaching activities. Further similar quantitative and qualitative data will be sought after the intervention in stage three to enable comparisons to be made and effectiveness of the interventions to be discussed.

It is hoped that the findings of this study will enable a detailed assessment on how teacher leadership and specialist teacher leaders in the field of digital technology can affect the use of such technology in learning and teaching activities in classrooms. Also, it hopes to define how teacher leadership might also continue to develop and maintain these skills in teaching staff as we embark on a 'new normal' way of teaching and learning taking in to account the health and safety measures that have been put in place as a result of the recent coronavirus pandemic.

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Finally to my son Callum, who has seen me chained to the laptop for hours on end with my head in countless books. Thank you for your patience and bringing me drinks and sweets just when I needed them. It's done – you can have your Dad back now!

Abbreviations

BERA	British Education Research Association
CLPL	Continuous and Lifelong Professional Learning
GDPR	General Data Protection Regulation
GTCS	General Teaching Council for Scotland
ICT	Information and Communication Technology
PEF	Pupil Equity Fund
PLC	Professional Learning Community
SELFIE	Self-reflection on Effective Learning by fostering the use of Innovative Educational Technologies
SERA	Scottish Educational Research Association
SLM	Standards for Leadership and Management

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Introduction

Leadership within education can take multiple forms and lead to different models taken from many different theories. It is not a straightforward task to make sense of all of these models as there are multiple ways to classify and examine them (Simkins, 2005). One emerging form of leadership within educational establishments is the notion of ‘teacher leadership’. Teacher leadership has been (and continues to be) one of the core leadership models in the area of educational management (Gümüş *et al.*, 2018). It is centrally concerned with relationships and connections amongst teachers in schools, and positively influences other teachers’ instructional practice (Muijs and Harris, 2007:112, Katzenmeyer and Moller, 2001).

The use of digital technologies in an educational context has become more prevalent over the past decade (Scottish Government, 2016). The importance of these technologies in the workplace has encouraged schools to make them a central part of learning and teaching activities so that they prepare young people for the world of work (Higgins, Xiao and Katsipataki, 2012). Digital technology in education has the power to engage and inspire students in a multimodal way; it can provide support to those who find written work challenging and can also prepare them for future employment by developing new skills and abilities. In 2017, Scotland’s digital sector was projected to be the fastest-growing in the economy by 2024 – seeing a 38% growth for digital versus a 17.5% growth for the rest of the economy overall (Digital Scotland, 2019). While children are exposed to technology from birth, the experience levels greatly vary from child to child indicating that there is a lack of equity (Merchant, 2015). These varying levels can be linked to economic circumstances and also how digital devices are regarded in different families (Mayall, 2010). With the increased focus on equity in Scotland through educational guidance and the Pupil Equity Fund (PEF), schools are challenged to minimise these varied levels. Therefore, supporting the development of our pupils’ digital technology skills will aid their progress into the world of work. This access and provision allow for a wealth of benefits to children’s education such as their attitude towards education, their engagement in it and it provides the opportunity for work to be more active, challenging and differentiated (Hemenway, 2000:115).

The rationale for this proposal stems from the Scottish Government’s digital learning and teaching strategy, ‘Enhancing Learning and Teaching through the Use of Digital Technology’ (Scottish Government, 2016). This policy document is discussed in more detail in the next section of this dissertation. The importance it places on the skills and confidence of educators in using digital technologies in the classroom for learning and teaching activities chimed with the activities being

undertaken by schools within the local authority in which the author works. This relationship, coupled with the role to which the author has been seconded, sparked their curiosity and allowed them to develop this research proposal as a way to understand how the relationship between teacher leadership and teacher digital competence might fit with these national priorities. All schools and early years settings have been able to develop their own approaches to teaching digital technology skills. Skilled teaching staff who have an interest in digital technologies are encouraged to share their skills and ideas with others in their clusters or authority-wide. The local authority has developed its own digital technology strategy in order to improve digital technology competence of staff and created a 'Teacher Leader, Digital Schools' role to provide support and guidance to schools on the best use of digital tools within the classroom and to raise digital awareness and promote the best practice and use of technology to enhance learning and teaching opportunities. During the coronavirus pandemic in early 2020, the skills and confidence of educators to use digital technologies for learning and teaching have had to increase and develop at an exponential pace.

This extended research proposal dissertation aims to, therefore, investigate the effects of teacher leadership on the digital competence of teachers in a Scottish primary school. The research questions that form this research proposal are:

- What is the effect of coaching and mentoring on the digital competence of primary school teachers in a Scottish primary school?
- How do these teachers view their own digital competency?

As this method of research involving human subjects which would have been a central part of this enquiry is now no longer possible, this extended proposal will now describe a *proposed* enquiry which investigates the effects of teacher leadership on digital competence as previously planned but also now take the opportunity to include data and discussion in the context of the global coronavirus pandemic. The presence of this virus caused widespread and immediate school closures and a move to full remote 'at-home' learning and teaching, causing many practitioners to have their digital competence challenged and the demand for guidance and leadership in this area to increase. As a result of this demand, using digital technologies for learning and teaching has taken on a renewed significance and importance in schools and as such, this extended research proposal has a central place in the field of how teacher leadership can affect practitioner digital competence during an unprecedented time in Scottish education. This extended research proposal also holds significance in the wider community as its results could have implications for local authorities to consider a teacher

leadership model to improve professional practice to positively impact the competency and professional learning of their practitioners. It is hoped that it makes a small and original contribution to the body of literature already available in this area.

This extended research proposal dissertation will follow a familiar structure. Firstly I have introduced the main themes of the research, set it against the current landscape in Scottish education and discussed its current relevance and importance which have been magnified due to the global coronavirus pandemic. I will then discuss relevant policies that affect the proposal and outline other relevant contextual information to aid understanding as to the importance of the research. Next, I will discuss and digest the findings of a rigorous and wide-reaching literature review and consider how this research proposal aims to build on this body of literature and identify any gaps in terms of current research. A discussion of the relevant theoretical framework and research paradigm will then take place, along with a description of the design of the study taking cognisance of its validity and reliability. The ethical approach of this study will then be delivered and examined before conclusions and considerations are then described and discussed.

Literature review

This literature review has three aims: to place the extended research proposal in the context of relevant policies, to attempt to explore the many different definitions of teacher leadership and the diverse ways in which it manifests itself in schools and to introduce the more specific topic of teacher leadership in the context of teacher digital competence. There is also a section where the methods of search employed during this literature review are explained and discussed.

Policy context

It is useful to use this part of the literature review to set the scene and the background to the extended research proposal for two reasons. Knowing the background and the context highlights the importance of the enquiry when the wider context of the use of digital technologies in schools is taken into account, and linking the research proposal to national and international policy, strategy and guidance affirms the emerging importance of the enquiry and the need for it to be brought about.

Children and young people today are growing up with digital technologies all around them. Schwab (2016) calls this the fourth industrial revolution describing the spread of digital technologies which is increasingly affecting all aspects of life. Education is emerging as another digital technology hotspot; technology is already impacting the way education is delivered and practitioners are very aware of the need for education to have a role to play in preparing young people for a world of work that will increasingly involve digital technologies. It's true to say that growing up in this digital age does not make 'digital natives' (Prensky, 2001) inherently competent and confident with digital technologies (European Commission, 2014). There are many challenges when it comes to including and integrating digital technologies in educational curricula. Schools are beginning to recognise the challenge is not only to ensure that young people develop the digital competencies needed but also to reap the benefits from the pedagogical use of technology (Cachia *et al.*, 2010). There is also a noted skills gap in the world of work: many new jobs are based on specialised digital skills (Cedefop, 2016). Also, the challenge of inclusion and how to bridge the digital gap between those learners with basic skills and those who are more adept at using technologies in their learning is more current than ever during the global coronavirus pandemic. A failure to include digital skills in school education could widen existing gaps in society and further exclude some parts of the population (European Commission, 2017).

When describing the different levels of relevant strategy, guidance and policy it is prudent to start at a European level. The European Framework for the Digital Competence of Educators (Redecker, 2017) captures teacher digital competence as a significant factor in the pedagogical use of digital technologies in classrooms. Relationships between these competencies and teaching and learning

practices are described and addressed in the European Framework for Digitally Competent Education Organisations (DigCompOrg, 2013). There is also a useful self-reflection tool, SELFIE: Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies, (SELFIE | Education and Training, 2020), which helps schools to identify their strengths and weaknesses in using digital technologies in classrooms. These three frameworks act as a foundation for common ground and common language for countries to begin conversations and develop their own strategy and policy at national and local levels.

Moving to a national level in Scotland and more specifically in Scottish education, three main documents shape how digital technologies are accessed, how skills are taught and how the aforementioned considerations for the skills gap in the world of work and the issue of inclusion are addressed.

The first is the General Teaching Council for Scotland's (GTCS) Standards for Registration, by which all education practitioners in Scotland must abide. These standards reflect the importance of digital technology skills that practitioners should have to ensure they can use them to enhance education by enriching learning and teaching opportunities.

- Standard 2.1.4 states that 'Registered teachers have secure knowledge and understanding of current guidance on the use of digital technologies in schools and know how to use digital technologies competently to enhance teaching and learning'
- Standard 3.1.3 states that 'Registered teachers skilfully deploy a wide variety of innovative resources and teaching approaches, including digital technologies and, where appropriate, actively seeking outdoor learning opportunities'
- Standard 3.2.1 states that 'Registered teachers enable learners to make full use of well-chosen resources, including digital technologies to support teaching and learning' (General Teaching Council Scotland, 2012)

Moreover, the GTCS Standards for Career Long Professional Learning (GTCS, 2012) refer to 'demonstrating a critical understanding of digital technologies and how these can be used to support learning'. This goes a long way to affirming that these skills are not only desired but increasingly they are required for teaching professionals to have up to date knowledge on the latest tools and methods of teaching with digital technology. It is noted however that there are 'gaps between teaching standards, policy and curriculum documentation and the reality of teacher's own skills, knowledge, motivation and ability' (Lemon and Garvis, 2016).

The second document which shapes the curriculum in Scotland is Scotland's 'Curriculum for Excellence' (Scottish Government, 2006). Within its defined curricular areas, the experiences and outcomes under the 'Technologies' heading detail the skills and learning and teaching activities that children should experience in schools. It's useful to note that these Technologies Experiences and Outcomes were refreshed in March 2017 to maintain relevancy so that learners have the knowledge, understanding and skills in the technologies required to succeed in today's world. This underlines the changing nature of digital technologies within education and proves that policy and guidance changes to reflect the rapidly changing digital world in which we live.

The third is the Scottish Government's digital learning and teaching strategy, 'Enhancing Learning and Teaching through the Use of Digital Technology' (Scottish Government, 2016). This strategy ensures that digital technology skills are a central part of its school curriculum and therefore enable the future workforce to have the necessary digital skills. It sets out the key objectives required so that educators and learners can cover and experience all of the learning and teaching activities outlined in the Curriculum for Excellence. The strategy contains four key objectives:

- Develop the skills and confidence of educators in the appropriate and effective use of digital technology to support learning and teaching
- Improve access to digital technology for all learners
- Ensure that digital technology is a central consideration in all areas of curriculum and assessment delivery
- Empower leaders of change to drive innovation and investment in digital technology for learning and teaching. (Scottish Government, 2016)

It is useful to note here that the first objective concerns the development of skills and confidence in educators and goes on to indicate the central role that local authorities have in this strategy: local authorities should develop a local strategy to provide their educators with a range of Continuous and Lifelong Professional Learning (CLPL) opportunities and provide an arena to share experiences and information to support the professional development of their educators (Scottish Government, 2016).

Moving then to a local strategy, the local authority in which the author works has produced its own 'Digital Learning and Teaching Strategy' (East Renfrewshire Council, 2018) in which it is interesting to note that the same four key objectives are summarised and planned for in increasingly local detail. These details, specifically under the first objective, reference the situation surrounding the skills and confidence of the teaching staff and how this will be addressed through a series of actions and associated impacts.

We have now journeyed from international strategy and policy through to grassroots actions and impacts and set the scene for the position of this extended research proposal. It is here that the role the author currently fulfils as a secondment is grounded and where this research proposal begins.

Methods of search and review

Firstly, it is useful to describe the methods of search and review the author has utilised in this literature review section. At first, the author used a broad search term and by using a systematic process, the author employed a general internet search using the phrase 'teacher leadership' as a base to gain an overview of the topic and to begin to understand the current thinking around it. The author identified general themes and common terms from these initial search results. The broad 'teacher leadership' theme was then narrowed down in to sub topics. These search terms – *leadership and management, distributed leadership, relational leadership, leadership for learning and teacher leadership digital technology* allowed the author to home in on literature that was more relevant to the research. These three-hundred or so pieces of literature concerned themselves with how teachers can be involved in leadership tasks and how teacher leadership can be a driver for improved learning opportunities in the classroom. Adding the term 'digital technology' showed that some current research had already been undertaken around this topic and that the idea of digital technology competence amongst staff was becoming more prevalent. Further inspection of these results showed how the roles of teacher leaders in schools can influence this competence and the associated use of digital technologies in learning and teaching. It was felt that the search had now moved from a general search to more defined terms which would yield relevant and targeted literature to review further. The author then began to think more about the current research more specifically, and as such, 'competency' was added to the search term. This yielded around twenty relevant results and therefore a gap was able to be identified in current research, as there were only very few pieces of literature concerning this sub-topic. Being more specific again, and to satisfy the author's professional curiosity, the search term 'coronavirus' was added to ascertain whether any relevant studies or peer-reviewed journal articles had been published that specifically dealt with teacher leadership in the context of the coronavirus outbreak.

All of these searches were first conducted initially in Google Scholar. Furthermore, specific searches were then carried out using EBSCOhost and ProQuest Academic online databases. These articles were uploaded to 'Mendeley' which acted as a digital locker for all the articles in which the author was interested. Digital notes on key themes and arguments were made directly on these articles in a digital

format. The author was then able to group pieces of literature by theme to begin to create sets of literature that could then be analysed and reacted to in this current research.

Teacher leadership

This following section aims to rigorously inspect and analyse documented thinking around teacher leadership as a broad topic. It will then focus on relevant literature to construct a current picture of teacher leadership in the context of digital technology use in the classroom, teacher competence in using these technologies, and how teachers have looked to leadership in this area during the global coronavirus pandemic during 2020.

Definition

The search for a definitive definition of 'teacher leadership' leads us to find varying and different ideas of what a concrete definition might look like. If we start by engaging with official policy documentation published in Scotland, there is an expectation that teacher leaders are 'highly effective' and show 'quality' in their practice (Donaldson, 2011). Taking a view from literature published in the early 2000s, York-Barr and Duke (2004) affirm that there is little research to be found that can quantify what these desired qualities look like. They suggest that the concept of teacher leadership has grown momentum in recent years (writing in 2004) and as such is now increasingly evident in many texts and policies concerning the practice of educational improvement. As suggested by Murphy (2005:3), teacher leadership is the action of 'teachers assuming greater leadership of the organisations in which they work.' In the past, Murphy (2005) suggests that teachers were only seen to be leaders in their own classrooms. Johnson (1989) agrees with this assertion that at that time, teacher leadership was only seen to be prevalent in classrooms, the teachers being the leaders only in their own rooms - 'their formal influence rarely extends beyond that' (Johnson, 1989:105).

Characteristics of Teacher Leadership

Turning to more recent literature and studies, it is true to say that there is a broad consensus that the key characteristics of teacher leadership are still the same, noting that in current years there is a realisation that teacher leadership can, and does, 'occur within and outside classrooms to influence school-wide instructional practice' (Cooper *et al*, 2016:87). Teachers are now becoming involved in matters pertaining to the whole school, not just their classroom, and more professional learning is now happening through collaborative projects outside the classroom, 'changing the nature of teacher

professionalism' (Oon, Chew and Andrews, 2010). Those involved in these projects, teacher leaders, provide direction and can influence their fellow teachers to improve learning and teaching outcomes (Katzenmeyer and Moller, 2009). Frost (2012) and Kessels (2012) describe this influence as being possible through formal leadership positions or roles within a school or embedded through the school's culture where informal leadership recognises the talents of the teaching staff to exercise leadership as part of their role for the good of the whole school community. Harris *et al.*, (2017) affirms that teachers can be instigators of change at both school and system levels and that this notion has been the subject of much recent analysis and discussion. This change could come about through the teachers being a part of or benefitting from an action research project in the school. Some research on the impact of these projects was carried out by Smeets and Ponte (2009) and they found that the impact of the action research project grew fast around the establishment, and likened this to 'a spreading oil slick in the school' (Smeets and Ponte, 2009). This view chimes with the author's personal experiences of leading a project in a school and seeing the impact of the research and the outcomes permeate all areas of teaching and learning in the school. In their review of the empirical research on the subject of teacher leadership, Nguyen, Harris and Ng, (2019), defined four hallmarks of teacher leadership: teacher leadership is a process of influence; has a basis of trust and reciprocal collaboration; operates both within and out with the classroom and aims to improve teaching and learning along with school effectiveness (Nguyen, Harris and Ng, 2019).

It is therefore clear to see that could still be some ambiguity around the term 'teacher leadership' referring to teachers leading within their own classrooms, out with them, or indeed leading in other ways in their educational settings. Harris (2005) suggested, even 15 years ago, that the sheer volume of literature around the subject shows how important the subject is becoming in school culture. (Katzenmeyer and Moller, 2001:82) asserts that teacher leadership is a new type of leadership while Crowther *et al.*, (2002:27) suggests that the notion of teacher leadership should be used to 'recognise the central place of teachers' in a school environment.

Influence Leadership

At this stage, it is prudent to now explore the notion of this kind of 'influence leadership' as opposed to the more traditional management concept. Kerrigan (2018) suggests that, for a school to run effectively, leadership and management must be appreciated as two distinctive yet, complementary systems of action. 'Leadership' involves setting a new direction for a group which has followers, whereas 'management' involves controlling and directing a group according to pre-established values or norms (Kerrigan, 2018). Kajitani (2015) asserts that leaders focus on a strategic journey and vision, inspiring others despite the day-to-day challenges and demands that are placed upon them. According to Fitzgerald and Gunter (2008), managers concern themselves with day-to-day activities such as

staffing, planning, controlling and directing. Managers tend to focus on current issues, leaving little time to think about a strategic vision (Fitzgerald and Gunter, 2008). These definitions could lead to the conclusion that managers are viewed negatively, since their remit is described as controlling, or short-sighted. It is true to say that professionals may be more comfortable or inclined to favour one style or the other, but as teaching is a lifelong profession and one where the skills of manager and leader are closely sited, critical reflection requires a practitioner to question, review and change existing practice and pedagogies (Richards, 1991; Scales, 2013; Carroll and McCulloch, 2014). 'The Standards for Leadership and Management' (SLM) clearly show that skills in both areas are required if practitioners are to meet current Scottish demands (GTCS, 2012). Therefore, practitioners should develop an inclusive vision to show expertise in both managerial and leadership contexts (Deschamps, 2005; McCartney and Campbell, 2006).

Distributed Leadership

The concept of 'distributed leadership' could be seen as a way to bridge the gap between leadership and management in schools. Wasley (1991) affirms that this could give people in a school 'the opportunity to contribute in meaningful ways'. Distributed leadership has become more popular and is now a desired form of leadership in schools in the United Kingdom (Harris, 2005; Martin, 2011; Spillane, 2005) by replacing the usual hierarchy and bureaucracy (Harrison and Lembeck, 1996) with a 'collaborative individualism' whereby professionals can work in both a collaborative and individual capacity (Harris, 2005:203). It is said by Ogawa and Bossert (1995) that leadership is embedded in the relationships that exist in a particular educational setting, rather than in particular roles, which confirms the more recent view of Anderson (2004), Smith *et al.*, (2017) and Snoek *et al.*, (2017) referring to teacher leadership as an influence rather than a role or formal authority. Martin (2011) counters this enthusiasm by expressing some points that should be taken in to account when thinking about this distributed leadership model in schools. A distinction should be sought between leadership being distributed and the delegation of tasks, as the two concepts differ and 'there is a tangible sense that schools allocate more significance to external pressures rather than driving forward projects fuelled by internal passion and enthusiasm' (Martin, 2011). Also, demotivating factors such as there being no recognition in either substantive job title or remuneration for the leadership tasks undertaken could lead to practitioners feeling undervalued, underappreciated and less likely to take on these teacher leadership roles in the future (McLean, 2003; Harris, 2005). All of this combined could lead practitioners to view the distributed leadership model as being a way to 'dress up' tasks and responsibilities to ensure that the workload of substantive leaders is lightened (Martin, 2011).

Relational Leadership

The importance and relevancy of the first research question in this enquiry - what is the effect of coaching and mentoring on the digital competence of primary school teachers in a Scottish primary school? – will be discussed here.

For coaching and mentoring of school staff by teacher leaders to be effective, the cultural architecture of a school and the staff working within it is very important when it comes to developing future teacher leaders (Muijs and Harris, 2006; Kajitani, 2015). It is only when these relationships within a school are fostered in a positive and nurturing way that true teacher leadership can be seen to be evident in a setting (Collinson, 2012; Harris, 2005; Martin, 2011; Muijs and Harris, 2006). It is true to say, and evident from the author's own experience, that time and effort must be committed to ensuring that these positive relationships last and are built upon throughout the academic year (Bryk and Schneider, 2003; Forlin and Cooper, 2013; GTCS, 2012; Kyriacou, 1991). This "relational trust" (Bryk and Schneider, 2003) allows all practitioners to display the qualities of respect, integrity and competence in all they do, and by doing so, further strengthening relationships as being pivotal to the culture of a school (Hattie, 2012). This "interpersonal leadership" (Bush, 2003: 79) shows a further link to collegiality and collaboration, as strong relational leadership is required for collaborative tasks to be successfully completed (Bush, 2003).

However, it is argued that relational leadership is only successful if all practitioners understand the importance of relationships in a setting. Durden (2011) describes situations where lack of reciprocal respect from practitioners unaware of this importance lessen the impact that relational leadership can have in an establishment. There can be a hesitancy to follow a colleague in a leadership role if the mutual relationship has been compromised or if the follower feels undervalued (Harris, 2005; Kelly, 2016). "Esteem, control and affiliation" (Northouse, 2015) are issues of incompatible differences between colleagues, often referred to as a "personality clash" (Northouse, 2015:229). Also, forming these relationships that are demanded of establishments where relational leadership is expected is time-consuming and a slow process. Inevitably, time is allocated to pressing and immediate issues day-to-day and as such, time for relationship building is limited (Hart, 2000; McCulloch, 2014). Hattie (2017: 23) suggests that there should be no confusion between "being busy and being a good teacher", and Pollard (2008) agrees with the assertion that developing these important relationships and reflecting upon them can be overlooked due to time constraints. There must be a fundamental commitment to learning from all parts of the education system (MacBeath and Mortimore, 2001; Stoll *et al.*, 2006). Learning environments where all pupils and indeed staff are motivated to learn is a key aspiration of many leadership teams (Martin, 2011). The teaching profession, through the GTCS Standards for Career-Long Professional Learning, (GTCS, 2012) expects a culture of engaging with

theory as well as reflection (Groundwater-Smith and Mockler, 2007; Schön, 1984). However, there is a converse view: Murray (1992) and latterly Hopkins (2008) put forward their view that a teacher's function is to teach, and therefore engaging in research should not be allowed to interfere with that fundamental function. Martin (2011) adds that 'practitioners and school leaders must show a willingness to partake in these activities, as well as maintaining high standards of teaching in their classrooms'.

Professional Development

It is at this point that the focus of the literature review begins to sharpen more specifically on the topic of teacher leadership in the context of its impact on teaching and learning and teacher digital competence.

As we begin to focus in on available literature around teacher digital competence before describing more details about this research proposal, it is encouraging to note the work of Yost, Vogel and Liang (2009) and their results which indicate that a teacher leader project is a viable strategy to improve teaching skills of new and experienced teachers. It is at this juncture that the importance of the roles and practices of teacher leaders in the professional development of other teachers within and across schools is discussed. The second research question - how do these teachers view their digital competency? - becomes important during this discussion. Following a study of the International Teacher Leadership project, Frost, (2012), declares that teachers can lead innovation, build professional knowledge and influence colleagues and practice in their schools if they have appropriate support structures and strategies. Concluding their findings from their recent review of research on the relationship between school leadership and teacher professional learning, Hallinger and Kulophas (2019) assert that teacher learning comes from multiple sources – from principals to shared leadership approaches such as distributed, collaborative and teacher leadership. Professional Learning Communities (PLCs) are another method that can be used to build capacity for sustained improvement, ensuring motivation, skills, support infrastructure and positive experiences are fostered and cared for (Stoll et al., 2006). Nguyen and Ng conducted a study of teacher collaboration in primary schools in Singapore and concluded that teacher leaders were critical to initiating and engaging colleagues in professional learning activities (Nguyen and Ng, 2020). Collinson (2012) assures us that teacher leaders can levy influence on colleagues by sharing innovative ideas and resources to support these studies mentioned here. Nguyen and Ng (2020) also agree that leadership and peer support were seen as important for teachers leading professional learning, and as will be discussed later, these qualities become more important during a global coronavirus pandemic.

Digital competence

As described earlier in this chapter, teacher leadership in the context of digital technology competence is a new theme and a young body of research, judging by the small number of articles that were found thorough the search criteria that have been employed for this literature review. Using the search term 'digital literacy' to find more articles yielded studies that took place in the late nineties and early 2000s. This highlights an important point when we begin to think about *digital literacy* and *digital competence*. Digital literacy first emerged in 1997, when Gilster introduced the term as 'a set of skills to access the internet, find, manage and edit digital information; join in communications, and otherwise engage with an online information and communication network' (Gilster, 1997:220). As new technologies and ways of accessing information have evolved in modern life, this definition has been contested as digital technologies now permeate our lives in so many different ways. Digital competence has come about as a term that recognises more than just the skills-focused digital literacy defines. Janssen *et al.*, (2013) adds 'particular knowledge and attitudes regarding legal and ethical aspects, privacy and security, as well as understanding the role of ICT in society and a balanced attitude towards technology' to define the wider notion of digital competence. A useful definition for 'digital competence' specifically for teachers is offered by Krumsvik (2007:68): 'digital competence is the teacher's ability to use ICT with a good pedagogical-didactic ICT understanding and to be aware of how this might impact the learning strategies and educational formation of pupils'. If we were to unpack this definition, we would see that it shows that teachers are required to make decisions about what kind of digital tools would be best utilised in an episode of learning, how they should be integrated, and why they should be used. Pettersson (2018:1) found that digital competence should not be viewed in isolation, but instead be 'regarded as an organizational task, influenced and driven by several contextual factors embedded within and across a wider school organization'. Teachers should be enabled to investigate and confidently explore what is new and relevant in terms of digital technology and develop methods so that they can include this digital competence in their teaching (Mannila, Nordén and Pears, 2018). Choi *et al.*, (2018) suggests that there is also a link between teachers' individual backgrounds, their own internet use and psychological characteristics such as 'internet anxiety and self-efficacy' (Choi *et al.*, 2018:1) and that this inherent thought process has a great effect on their use of digital technologies in classrooms. Indeed a teacher's own confidence with digital technology can have an impact on students' learning in ICT areas (Bingimlas, 2009). The study by Moltudal *et al.*, (2019) suggests that teacher digital competence and their classroom management abilities during technology lessons are closely linked and that many professionals are put off from using technology in classrooms for fear of being unable to manage learning events successfully. There is also the ever-present issue of Selinger's (2001) tension between teaching about ICT and teaching

through ICT. Even though this issue was detailed by Selinger nearly twenty years ago, when digital technologies were referred to as ICT (Information and Communication Technology), the issue still rings true today. As mentioned already when talking about policy, Scotland's Curriculum for Excellence describes the teaching of digital technology skills to be discreet and embedded in subject teaching, rather than skills being taught in a standalone way. This is where teacher leadership is critical, as without this kind of innovation, changes are often small scale, non-sustainable and often only use digital technologies to replace existing practices in schools (Glover *et al.*, 2016). Hattie (2012) suggests that sustainable implementation of new pedagogical methods is difficult, especially if the initial champion is no longer in place, which adds to the argument that effective, distributed and relational leadership in schools, leading to the already mentioned 'oil slick' effect (Smeets and Ponte, 2009) is needed to drive real pedagogical change. Digital technology integration in teaching practice is challenging and there needs to be an understanding of the technology on offer, for example, its affordances and constraints (Koehler and Mishra, 2009). Teachers can develop these skills and awareness by themselves, using online tutorials, but to make large scale effective use of digital technologies and associated teaching methods, there needs to be a way found to enable the dissemination of this information in an easily accessible way. Beycioglu and Kandukci (2014) and Islam and Grönlund (2016) suggest that principal and indeed teacher leadership has been shown to have a direct and lasting impact on the success of such initiatives. This so-called 'second-order' change (Marzano *et al.*, 2005) is innovation-driven and requires a fundamental change from current practice. Second-order barriers are intrinsic and include beliefs about current classroom practices and their digitalisation. Thinking about the technology itself and taking this in isolation from teacher learning, it should be noted during the pandemic and the closure of academic settings, there have been high-level discussions surrounding the negative aspects of closure, and the huge investments and high trust that technology is the only answer to learning when educational establishments were closed (Bozkurt and Sharma, 2020). 'We set our hopes on technology, hoping that it will save education and cure all the problems' (Weller, 2020). It should be remembered that technology is a tool, and the right approach should not be learning from technology but learning with technology (Bozkurt and Sharma, 2020).

This notion of second-order change has come about more quickly than anticipated in educational establishments due to the coronavirus pandemic in 2020. Governments around the world closed all educational settings due to the virus and made the strategic decision to transition to remote learning. It is reported that more than 1.5 billion learners of all ages from around the globe are affected due to school and university closures owing to the COVID-19 outbreak (UNESCO, 2020; UNICEF, 2020). The affected number of students equals around 90% of the world's enrolled students (UNESCO, 2020).

This required immediate and swift transformative practice to move to online delivery of learning, which would require radical changes in attitude, values and beliefs (Heifetz and Laurie, 2001). Academic leaders must use a new toolbox of intellectual stimulation, influence and inspiration while providing essential training, support and resources to staff suddenly immersed in online teaching (Fernandez and Shaw, 2020). This kind of influential teacher leadership is therefore essential and vital in this situation, so that academic leaders capable of leveraging these types of skills and talents, by using a distributed leadership style, will allow establishments to implement remote learning successfully (Fernandez and Shaw, 2020).

Summary

As can be gleaned from this comprehensive literature review, there are policies and strategies in place that direct governments and local authorities to the importance of embedding the use of digital technologies in teaching and learning activities. Some of the guidance and the strategies include not only what should be included, but also how this could be done through using teacher leadership as a vehicle to ensuring best practice is employed in all settings.

Teacher leadership is a term that is widely known, but hard to define since it can be different in many different contexts. It is understood and agreed that this kind of leadership can be seen within classrooms, out with them and also in local authority contexts. There is value in this form of leadership, and in all of its various iterations.

Turning to teacher leadership in a digital competence sphere, linking the digital strategies with how it manifests itself in schools and other educational establishments, there is some general research and literature. The coronavirus pandemic has highlighted the need for teacher leaders in the context of supporting teachers in the 'new normal' of online and remote learning practices.

It is hoped therefore that this research proposal goes some way to add to this body of literature, linking strategy with the practical teacher leadership that is required to support teaching staff in using digital technology and improving their competence with these tools.

Theory and Methodology

Theoretical Framework and Research Paradigm

Clarke and Visser (2018) affirm that it 'can be a problematic endeavour and can cause relatively inexperienced researchers angst when trying to decipher the various methodologies and paradigms.' Even more experienced researchers can find articulating exactly what the concepts behind the paradigms and methodologies are challenging (Kivunja and Kuyini, 2017). Due to these potential pitfalls, researchers can often lose sight of their research methodology and it is important, therefore, to have a sound understanding of the various approaches that could be adopted and to use this knowledge to select a paradigm for the research outline (Xinping, 2002).

There are three important notions that should be defined to aid understanding: the notions of 'research paradigm', 'methodology' and 'method'. Mertens (2014:8) asserts that a research paradigm refers to 'certain philosophical assumptions that guide and direct thinking and action'. 'Methodology can be defined as a plan of action that is used when employing certain research methods, and these 'methods' refer to the specific vehicles of collecting data to be analysed later.

Candy (1989) helpfully suggests that although there are a large number of research paradigms, that they could be grouped into three broad headings: positivist, interpretivist and critical. A fourth general heading was put forward by Tashakkori and Teddlie (2003) - the 'pragmatic' paradigm - which includes and joins together aspects of the positivist, interpretivist and critical headings. It enables researchers to combine aspects of different approaches which, if used effectively, can mitigate the potential weaknesses associated with any single approach (Onwuegbuzie and Leech, 2005). Confirming this, Creswell and Creswell (2017) describes four major research paradigms: pragmatism, interpretivism, post-positivism and critical theory. Traditional attitudes towards unilateral methodologies, for some, have shifted in recent times, with it being increasingly acceptable to combine methodologies (Hammersley and Atkinson, 2007; Clarke and Visser, 2018). Pragmatism is linked closely with being practical and suggesting answers that work in a context, rather than discerning the absolute truth of a matter (Wahyuni, 2012). According to Pansiri (2005) and Creswell and Creswell (2017), it is a question focused and affords the researcher a range of possibilities when conducting their research. It could be gleaned that for this reason, pragmatism has been found to be the most commonly used approach for qualitative research in the field of education (Caelli et al, 2003).

It is useful to now try to define each of these approaches, before selecting the most appropriate one for this study. The pragmatic approach, closely linked to Dewey's (1933) 'theory of knowing', concerns itself with empirical testing and quantitative methods holding within it this belief that its findings are

true (Carroll, 2018; Kock et al., 2017). Focusing on the research problem, it calls for various methods of data collection and analysis. The interpretivist approach can be seen to be qualitative and subjective in nature. This approach allows the researcher to view the world through the eyes of the participant, giving people a voice (Carroll, 2018; Thanh and Thanh, 2015). It is interested in 'investigating the processes of interactions' through their experiences (Creswell and Creswell, 2017). These first two approaches have been seen to form a perceived divide, according to Leech and Onwuegbuzie (2007), which, according to them, could potentially be counterproductive. Madey, (1982) asserts that the post-positivist approach encompasses both of these methods, allowing the researcher to be flexible when choosing their data collection methods in order to validate their findings and potentially help to heal this divide. Assuming that 'knowledge can be generated through testing propositions or hypotheses' (Willis, 2007) it is based on observing and measuring 'objective reality' (Creswell and Creswell, 2017). Critical theory (Guba and Lincoln, 2005) emerged from other paradigms not addressing 'marginalised individuals in our society or issues of power and social justices, discrimination and oppression' (Creswell and Creswell, 2017). It possesses the hallmarks of a transformative paradigm in that it encourages investigation of the lives and experiences of marginalised groups (Mertens, 2014).

It follows that a pragmatic approach would best suit this type of study due to its practical nature. This approach also allows for the combination of several approaches while being practice-orientated (Caelli *et al.*, 2003; Carroll, 2018). There is a well-founded association between the pragmatic research paradigm and mixed-method approaches, however, the pragmatic approach emphasises the way to conduct research rather than just the 'how-to issues of research' (Morgan, 2014:46). Some researchers assume that using a mixed-method strategy is better by definition than a singular approach. Using multiple data types, however, won't add to the legitimacy of results unless 'theoretical logic is maintained' (Mason, 2006:10). It is therefore logical that this study will employ a mixed-methods research approach to data gathering. This method of data gathering will allow a variety of useful information and data to be gathered to build up a complete picture of the research problem and the way the intervention has been received.

Study Design

The study has been designed to be carried out in three sequential stages, each one containing appropriate methods of data collection and associated data analysis phases. These phases (within the three stages) are detailed below under the appropriate sub-headings.

In **stage one**, qualitative data collection will take the form of face-to-face interviews, participant observation sessions and field notes in a learning journal. Quantitative data will be gleaned from digital technology usage statistics taken from two online administration consoles. During **stage two**, interventions will then take place to include digital learning training sessions, team-teaching learning experiences and individual coaching sessions to increase teacher competence and confidence in using digital technology for learning and teaching activities. Further similar quantitative and qualitative data will be sought after the intervention in **stage three** to enable comparisons to be made and effectiveness of the interventions to be discussed. The outcomes of this discussion will then form a body of data whereby the answers to the research questions can begin to be highlighted.

Validity and Reliability

According to Braun and Clarke, (2013), the term 'validity', and more specifically 'construct validity' refers to the data collection methods of a given study measuring what they aim to measure. Methodological triangulation will be used to validate the findings that are gleaned from the qualitative and quantitative data. It will aid the researcher to complement and supplement the findings from the qualitative data with further numerical usage data. Methodological triangulation employs multiple methods to study a single problem (Hastings, 2012). This notion 'has been found to be beneficial in providing confirmation of findings, more comprehensive data, increased validity and enhanced understanding' (Bekhet et al, 2012: 40). This type of triangulation may take the 'within-methods' form, where multiple qualitative or multiple quantitative approaches are used, or it could also take the 'between-methods' form, where both quantitative and qualitative approaches are used (Hastings, 2012). Within-methods triangulation has been criticized as a weaker strategy, as only one method of data collection is used. This does not, therefore, compensate for the limitations of the particular paradigm that has been chosen (Hastings, 2012). On the other hand, between-methods triangulation offers the researcher the chance to mitigate biases that appear in one research approach by including other sources of data (Flick, 2012). This study will attempt to harness the strengths of different data types to produce a comprehensive view of the intervention (Carroll, 2018; Drouin et al., 2015). It should also aid in the 'completeness of description, and the accuracy and sensitivity of interpretation' (McDonough and McDonough, 1997:232). As can be gleaned when reading on, this research will take the form of a partially mixed sequential dominant status design (P4) (Leech and Onwuegbuzie, 2007:271) where the qualitative data is given more weight.

To carry out the data gathering strategies that are outlined in the next section, the method of 'sampling' will be employed to create a data set. This can be challenging, as determining a suitable sample size brings with it some considerations. Olejnik (1984) describes these as 'criterion for

statistical significance', 'level of statistical power', 'statistical analysis strategy', and the 'size of an effect judged to be meaningful.' When thinking about sample size, researchers have to be mindful of significant time implications associated with gathering and analysing collected data. Therefore a large sample size could limit in-depth analysis and result in conclusions that could be seen to be superficial (Sandelowski, 1995). It is for these reasons that have been discussed that the research proposal will include five primary school teachers from a small primary school within a local authority in Scotland. Five teachers is a manageable number and as they all teach in one primary school, there will be consistency in experiences and exposure to digital technology. It should be borne in mind that this type of teacher-led research is contextualised in nature and there is always the question of whether the findings from this kind of research could be generalised to a wider stage (Noble and Smith, 2005). Teacher-led research could identify findings that may be localised and only relevant to that particular context (Murray, 1992; Groundwater-Smith and Dadds, 2004). It is therefore prudent, when analysing the results of the research, that the question of whether the research would have the same outcomes if it were carried out in another location, school or indeed local authority. The reliability of data is an important consideration and broadly refers to receiving the same results if the study was conducted with another participant group (Yardley, 2008). It may also be the case that the results could be different if the research were to be carried out in a different school within the same local authority. There is also the issue of bias when carrying out this kind of teacher-led research (Kukull and Ganguli, 2012). The mitigations that this research will employ to counter this are described later in this chapter. Finally, the issue of generalisability or the 'horizontal extension' of results should be mentioned. Braun and Clarke, (2013), refers to this notion of 'generalisability' in the context of a study's results as to whether the results could be applied to a wider population. It is the author's view that some of the results of this study, given that it is to be carried out in one primary school with a small sample size, could be generalised across other schools in the same local authority, but caution should be noted about this as the results will rely heavily on individual teacher perception and the accessibility of digital technology which varies greatly across schools within the local authority.

Methods of Data Collection

In this section, three methods of data collection will be described which are proposed to be employed in this research paper, along with their advantages and associated disadvantages. The methods for collecting qualitative data will be participant interviews and field observations. The methods of collecting quantitative data will concern data taken from two online user administration portals.

I propose to conduct face-to-face, audio-recorded interviews with the mentioned five primary school teachers in a small primary school within a local authority. These interviews will be conducted at the beginning of the research (stage one), and again at the end of the proposed five to seven-week research period (stage three). I envisage each interview to last no longer than one hour so that the data collected is manageable to process and analyse. This method has been chosen as there are advantages to this qualitative research approach: Creswell and Creswell (2017) suggest that 'participants can provide historical information' and that questioning can be adapted depending on the answers the participant gives to previous questions. This approach is more suited to this study than a simple questionnaire technique for this very reason. Questionnaires could be anonymised and this could attract more honest and full feedback as the researcher would not know who has given certain answers. Newby (2014) suggests that this perceived weakness of questionnaires produces data that can be a superficial assessment of a very complex construct. It is hoped that the face-to-face interviews will reveal more detailed data than a generic and anonymised online questionnaire would and that the interviewer could explore any emerging comments or themes that are brought up by the interviewee. There are, however, disadvantages to this qualitative research approach. Bias can be seen to be a cause of invalidity in interview situations, and is defined by Lansing et al., (1961:120/1) as 'a systematic or persistent tendency to make errors in the same direction, that is, to overstate or understate the true value of an attribute.' Creswell and Creswell (2017) agrees by suggesting that a 'researcher's presence may bias responses' and that responses could be 'filtered through the views of interviewees.' Thinking about how this could be overcome in this study, Silverman (1993) suggests a structured interview can address reliability, and open-ended questions allow for participants to demonstrate their unique view of the research problem. I will therefore develop interview themes to include questions around teacher perspectives and opinions on using digital technology in teaching and learning, current methods being used and factors enabling and hindering the use of digital technologies in classrooms.

Observations play a key role in educational research as it records the participants' behaviour and what they actually do, rather than what they might say or write (Menter *et al.*, 2011). These observations can hold a structure, where the observer has a list of criteria to look out for, or it can be unstructured and open-ended where no criteria are pre-defined (Dudovskiy, 2016). Bias can occur within these observations as they are subjective in nature and the conclusions that might be drawn from them could be filtered by the observer's own thoughts and feelings (Elton-Chalcraft *et al.*, 2008). A suggested way to minimise this bias and to record the interactions that are being observed is through the use of video, however, the presence of a video camera could in itself affect the interactions of the

participants being observed (Elton-Chalcraft *et al*, 2008). It can be said that the mere presence of a teacher can influence their reactions, therefore, considering how and where you will observe from are important considerations (Elton-Chalcraft *et al.*, 2008; Sharp, 2012). The research project proposes recording thoughts and key themes in a learning journal that come about during the interventions. Employing a learning journal in this way promotes reflection and helps the user draw connections between data gathered (Bisman, 2010; Boudah, 2011). I intend to collect observation data, reflective in nature, while training sessions are taking place and also during teach-teaching lessons and sessions which are planned to take place during the second phase. When analysing this data, it will be helpful to categorise the data gathered in to broad themes. To be specific, the participant observation sessions aim to collect data around the nature of digital technology use post-intervention and assess the confidence of the participants. This is planned to be done through observation of the use of confident oral language and use of confident body language. This qualitative data will be included in the thematic analysis.

The quantitative data to be collected in stages one and three of this research will be gathered from two online sources. Source one is Education Scotland's Glow portal. This portal is used by educators and learners in Scotland to access Microsoft 365 tools and the Google Suite for Education set of tools. All educators and learners have a login for this service issued by their school. Authorised administrators within each local authority have access to advanced analytics and user data which is useful to see how the different services within Glow are being accessed by schools. I will be able to access school user data to include the number of login sessions, the number of unique users logging in and the number of times individual apps within the portal have been accessed. This information will be able to give a picture of the usage of various tools and help to allow for comparisons in different time frames.

Source two is the Google Admin Console. Much like the Glow admin console, the Google console gives more detail on usage statistics for Google tools such as Google Docs and Google Classroom. It also serves as the hub for managing and administering the local authority's fleet of Chromebooks. The information that both of these systems collects is very similar in nature and therefore a direct comparison will be able to be made. Frees and Miller (2013) suggests that a simplistic way to analyse and present the data should be chosen as the information is not complex in nature. Johnson and Onwuegbuzie (2004) describes this quantitative data collection method can add precision to the words and opinions gathered from face-to-face interviews, and it is for this reason that this method features in this research proposal. This use of qualitative and quantitative data is able to give strong evidence

in order to conclude and debate the findings of this research through corroborating and converging the evidence gathered.

It should be noted here that since educational establishments closed due to the global coronavirus pandemic, there was an immediate need for learning to continue online in a remote fashion. This caused an overnight increase in the use of tools housed within Glow (for example Microsoft Teams and Google Classroom) and this, therefore, influences the data that can be downloaded from these two administration consoles. It should, therefore, be borne in mind that there has been this external influence on this qualitative data and that the data should be interpreted taking this situation into account.

The data collection procedure must be clear and unambiguous as this reduces the risk of participants being unclear about what is expected of them and their contributions, therefore aiding the overall effectiveness of the enquiry (Kristjansson *et al.*, 2013).

The plan for data collection in stages one and three will involve the elements that will now be discussed. The group of teachers will be given an outline of the programme, the expectations of them and what is hoped to be gained by the study. Each participant will then be interviewed and the conversation audio-recorded and auto-transcribed via an app. Questions will initially be the same for each participant but then dependent on the subjects covered and suggested in each conversation, supplementary questions may differ. After this, in stage two, interventions will take place in various forms which reflect the role of a teacher leader. These interventions could take the form of direct teaching with the participant and their class to show a new piece of technology or a new way to record learning, one-to-one sessions with the participant to show new technology or how to use this in their classrooms with their classes, online or face-to-face CLPL sessions where the participant is invited along, as well as online and in-person support to troubleshoot issues and queries as they arise. Along with these interventions, and possibly during the same timeframe, the researcher will maintain an observation journal to note down attitudes towards these interventions and observe the participant teaching while using these new technologies in the classroom setting. In stage three, participants will then be invited to take part in a further interview that will take the same form as the first, including questions that will take the form of the participant being able to look back and reflect on the experiences with the researcher during the intervention stage and be able to assess the effectiveness of these interventions. Concerning the quantitative data, a different approach could be employed. As this data is continually being collected and stored, it can be interrogated at any point of the data collection phase. Consideration should be given to inspecting this data while the data collection with the participants is being undertaken. If any increase, or indeed decrease, is seen in the uptake and use of the digital tools discussed above, it may skew the interventions that are concurrently taking place.

It is therefore proposed that the quantitative data is only accessed at the end of the data collection phase and used to corroborate and validate the qualitative data that has already been collected – the partially mixed sequential dominant status design (P4) (Leech and Onwuegbuzie, 2007:271) where the qualitative data is given more weight – as mentioned earlier in this paper. Another important consideration is the timeframe of this data. At present, the usage data for Glow and the tools within it spans at least two years. It is therefore prudent to consider which date range to use when considering this data in the analysis phase. As this research proposal was originally to be carried out in early 2020, the data would have been used from when the interviews began with the participants and extended the date range until the end of the interventions and the subsequent round of interviews with the participants. However, as has already been discussed, the global coronavirus pandemic required all educational establishments to quickly find ways to deliver learning online, and in the local authority in which this study is proposed to be based, that delivery enlisted the use of Glow and Google tools. This doubled the usage rate of these tools overnight and as such, any increase in use as a result of the interventions discussed in this study would be hard to find within this increase. Data from before educational establishments closed could be used as a baseline, and data from the individual school could be analysed in a way in which the ‘coronavirus effect’ could be stripped out to gain a better picture of the intervention. Alternatively, the data could be used in its raw form, and the research could be positioned in a new setting taking into account the global coronavirus pandemic and include this backdrop in the interview questions as well as considering it when accessing the quantitative data. The interventions which have been discussed above actually happened of their own accord in the reality of the coronavirus lockdown, and this could also be discussed as part of the interview process. At the time of writing, the effect of the global pandemic on educational establishments is still changing, and as such, these considerations could and should be taken in to account when this research proposal moves to become an actual research project.

Data Analysis

The process of data reduction, an important aspect of qualitative data analysis according to Madey (1982) will be used to analyse the data collected in this study. Reducing the data does not mean that any data is reduced or overlooked, moreover it serves to refine the data to discover themes and trends without changing the data collected (Cohen *et al.*, 2018). Using this method caters for large amounts of data to be processed and it’s true to say that this process happens in the subconscious as the researcher looks at and analyses the data collected (Miles and Huberman, 1994).

It is important that a clear coding framework is created so that the evidence trail can be tracked and the integrity of the study is maintained (Nowell *et al.*, 2017). I will be able to seek out and highlight

key themes from the data reduction by employing a thematic analysis to reduce the data collected (Nowell et al., 2017). This kind of thematic analysis is accessible for inexperienced researchers as it does not involve in-depth theoretical knowledge (Braun and Clarke, 2006; King, 2004). Having a fundamental understanding of the 'theoretical knowingness' behind the strategy affords the researcher help to produce a good quality thematic analysis (Braun *et al.*, 2018). A concept or mind map type display mechanism will be used to illustrate key themes emerging from these face-to-face interviews. These way of presenting these data will endeavour to be more visually appealing than if long passages of text were produced, allowing readers digest and analyse it effectively. It is true to say that when passages of text are too lengthy then key information can often be missed as the reader glosses over it (Miles and Huberman, 1994). Employing this kind of data presentation will allow successful and meaningful analysis of the qualitative data. The flexibility of thematic analysis is seen as advantageous, however it can also be deemed a negative as it can lead to inconsistencies and a lack of cohesion (Holloway and Todres, 2003). Even though conclusion drawing and verification – the author's 'concurrent flows' - is referred to as the final stage, it is right to suggest that these conclusions will also be drawn throughout the data gathering phases (Miles and Huberman, 1994:11). Multiple conclusions may be drawn together from both the qualitative and quantitative data bi-laterally to produce conclusions and possible recommendations for future research.

Regarding the numeric, quantitative data that will have been collected during this phase, as this is automatically collected by the two administrative portals, no data reduction will be necessary. A significant benefit of these portals is that they assimilate and present the data in simple tabular and graphical forms to fulfil various needs with minimal interventions. This means that the data can be read and analysis undertaken as graphs and data tables can be created with ease. As this data will be used to compare usage of the Glow and Google tools by pupils before and after the interventions in stage two, no statistical analysis will be needed. The online portals show bar graphs and raw data tables in which there are numerical counts of individual login sessions. The data comparison analysis here will simply be the number of individual login session before the interventions in stage two, compared with the number of individual login sessions after stage two interventions.

Ethical Considerations

Ethical issues are faced in all research projects and therefore they 'should be conducted within an ethic of respect for the person, knowledge, democratic values, quality of educational research and academic freedom' (BERA, 2018). As a practitioner in Scotland, it is also important to note that the Scottish Educational Research Association (SERA) and General Teaching Council for Scotland Code of Professionalism and Conduct should be considered, for similar reasons, at all times.

The three most pertinent ethical issues that are faced in this extended research proposal will now be discussed.

‘Do no harm’

One of the first ethical issues to consider during research is to ‘do no harm’ (Locke *et al.*, 2013; Vanclay, 2013). Labaree (2011:438) notes that educational researchers and practitioners have caused ‘damage’ to teaching and learning in the past due to their competing agendas, therefore, adopting the principle of ‘do no harm’ is vital. It is important to note that this particular research project will not involve children and young people. To further ensure this principle is adhered to, and following the BERA (2018) guidelines, participants will be allowed to withdraw from my research at any point and for any reason. In compliance with BERA’s (2018) Guidelines for Ethical Research, the required Participant Information Sheet and Consent Form have been designed to ensure that participants fully understand the research procedures and that their participation is voluntary. It is very pertinent at this point to discuss the effects of the global coronavirus pandemic on the ethical considerations of this proposed research study. Following on from this principle of ‘do no harm’, the College of Social Sciences Management Group at the University of Glasgow ceased any research involving human subjects on 9th April 2020. During this time of anxiety and uncertainty for many people, the demands of participating in research projects either face-to-face or online may not be ethically appropriate or sound. It was also considered that for some time to come, access to participants might be difficult and unviable due to the changing nature of the pandemic and the effects this will have on personal circumstances. It is because of these pertinent and just ethical considerations the previously proposed research project could no longer continue. Demands on the teachers that were planning to participate in this study increased exponentially as they had to change their lesson delivery from face-to-face to online within a matter of days. Even now, at time of writing, it is unclear as to the model of lesson delivery in the next academic session, and with that in mind, it still may be a very important ethical consideration as to the participation of these teachers due to the unstable nature of the pandemic and the additional pressures that the teachers face daily. It is for these reasons that a full research project of this scale might not be able to be carried out until such a time when teachers are in a position to take stock of the situation and have sufficient time and personal space to participate effectively.

Anonymity and Confidentiality

Anonymity and confidentiality during the research, analysis and reporting stages (Connolly, 2003) is another important ethical consideration to deal with in this type of research project. Protecting the anonymity and confidentiality of participants endeavours to prevent any negative outcomes of the intervention (Moosa, 2013; Clark, 2006). Research may be sensitive and if confidentiality is not assured

then participants could potentially provide less truthful feedback and could withdraw from the process. This consideration is very important in a study such as this. The participants are already known to the researcher, and they will already have had some interactions in the past along the same lines as the planned interventions as part of the research project. Also, the researcher holds a position within the local authority which differs slightly from the participants, a role in which certain confidences are held and a role where details of what is happening in schools could be shared. It is for this reason that the researcher will be explicit to make clear that nothing that happens in the course of the research project will in any way prejudice or affect the professional working relationship that the researcher has with any of the participants. A process of anonymising data will also be employed by using a coding system and pseudonyms to protect the participant's identities. It is interesting to note some contradiction regarding the unwavering need to anonymise participants in research findings, as Wiles *et al.*, (2004) suggests regarding the study they carried out. The authors of that study discovered that some participants wanted to be mentioned by name as they found this to be 'empowering' (Moosa, 2013:487). This, although understandable in some circumstances, would not align itself with the educational research I wish to undertake for the reasons stated above.

There is a slight risk that the sample size of the group being studied becomes too small. This is because the chosen primary school is small, employing few teachers. This risk has the potential to make the results unreliable and invalid. I will ensure that all the participants are comfortable in being involved in the study at every stage, especially during the interventions. In spite of the planned digital learning sessions, there could be a possibility that some teachers lack confidence in using digital technology. This 'lack of confidence could lead to variances in the delivery' (Prestridge, 2012). In order to guard against this, I plan to 'team-teach' with the participating staff, in order to ensure a consistent delivery and explanation of the intervention, as well as to ensure consistency during the data-gathering phase.

Handling and Storage of Data

In terms of the handling and storage of data gathered as part of this proposed study, certain specific considerations should be addressed. Locke *et al.*, (2013) suggest that this has always been a key ethical consideration in research. The introduction of the General Data Protection Regulation (2018) has made this part of research an even more important issue. All data gathered during the course of this study will be stored in a secure location and later disposed of using appropriate methods. This disposal will not include that data gathered from the Glow and Google online portals, as these are accessible to others apart from the researcher. This disposal of information will be in line with BERA and SERA guidelines. The learning journal, along with notes, transcripts and audio recordings of face-to-face interviews and qualitative data from the two administration portals will be kept in a secure, locked

location if printed, or saved in a secure, password-protected environment if digital in nature. Any pupil or staff reference will be anonymous and will refer to them as a code with the key being destroyed. This project lies within the improvement plan for the Education Department of the relevant local authority, and therefore the headteacher of the school on which I intend to focus, as well as the council's Quality Improvement Officer in charge of digital learning may require access to the data for the purposes of further improvement of the use of digital technologies within the local authority.

Project Management

In this section, there will be a discussion around the possible timeframes of this research project, and also around any risks that are associated with the project and this timeframe. As the project now sits within the background of the global coronavirus pandemic, these timeframes are likely to need to be revised and changed, perhaps at short notice.

It is envisaged that the data collection and intervention phase of this project should last around five to seven weeks, starting with the initial interviews of participants, then four weeks of intervention time, followed by the follow-up interviews in the last week. This is however reliant on there being agreement from an ethical point of view that face-to-face or online interviewing of human subjects can resume. It is also dependent on the participants in the school being able, willing and have the time for, the interviews themselves as well as the following interventions. It may well be the case that the educational landscape is still changing and as such, there may be no room for a meaningful research window to take place. To mitigate this risk, it is proposed that this research project turns in to more of a retrospective project which will take place after the pandemic is over and 'normal' ways of learning and teaching resume. Interviews would then take the form of a look back at the effects of the pandemic and the role of teacher leadership in terms of digital technology use. An online questionnaire to a wider audience of teaching staff could also be used to widen the pool of participants should the original set of participants be unable to contribute. This research project is not reliant on specific members of staff, moreover, it is only applicable to teaching staff in a certain primary school. There is the potential for teachers to move schools but this is not seen to be a risk to this study. Access to digital technologies or failures with digital technologies are an associated risk, as the perceptions of the confidence and competence of teaching staff will be coloured by their experiences. If a particular technology isn't functioning as expected in the intervention phase, steps will be taken by the researcher to enable that technology to be fixed, and the intervention will pause until this is

completed. This is to ensure that the participants' experience of the technology is not clouded by the fact that it was not functioning as expected.

Conclusions and Recommendations

The importance of using a variety of digital technologies in learning and teaching activities in the classroom is well documented, and supported by the international, national and local policies and strategies for digital technology integration. To support this, local authorities have developed strategies and programmes to enable this use of digital technologies by improving teacher competence in digital tools. The notion of 'teacher leadership' has played an important part in these strategies, enabling skilled practitioners to coach and guide less experienced colleagues. As has been explained in detail in this paper, this study proposes to investigate the effects of this leadership on the digital technology competence of primary school teachers.

The global coronavirus pandemic has shaped and affected all aspects of our lives, notwithstanding this research proposal. It was envisaged that this paper would have discussed the findings of the research which, unfortunately, is now only proposed and hypothetical for reasons already discussed. The global pandemic has increased the focus on the use of digital technology in teaching and learning, however, and therefore it could be said that the events of school closures and a move to lesson delivery online have served to focus attention on these methods. Along with that focus, there has been a real and sustained need for teachers and education practitioners to engage with these technologies, many of which they may not have used before. This has caused an increased demand for training, coaching sessions and online CLPL events so that teachers feel competent and confident in using these technologies to continue the education of young people. This has led to many forms of teacher leadership being developed on the fly, in an ad-hoc way. Many of these situations and roles are still being modelled as the pandemic progresses and more information and guidance is published by governments as to how learning and teaching can continue amid this health crisis.

Should this research proposal move to be a research project, it will inevitably still have the backdrop of the coronavirus pandemic. Teacher leadership will continue to be a feature of how teachers are supported and coached through this 'new normal'. There would be a benefit to this research being carried out to investigate and to understand more about teacher leadership in this context, and how it links to teacher professional learning. This would contribute to the body of literature around this topic, and break new ground as, at present, there is a gap in the research surrounding the move to online, remote learning.

On a personal note, it is hoped that this proposal can be carried forward and the data collected and analysed so that it can contribute to the understanding of teacher leadership in the area of digital technology competence.

Note

It should be noted that this paper was originally designed as an empirical dissertation describing how the research question was designed, how the research was undertaken and what the results of this research showed.

It had to change focus, and become an extended research proposal dissertation, as the unfolding situation surrounding the global coronavirus pandemic made data-gathering with human subjects impossible.

With this in mind, and for reasons of clarity and transparency around plagiarism, certain sections of this extended research proposal dissertation will mirror that of the original, shorter proposal that had already been submitted by the author to the University of Glasgow as part of this Masters course of study before the global coronavirus pandemic took hold. These sections have been expanded upon in this extended research proposal dissertation.

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