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MEDIATING THE FLOW OF PROFESSIONAL CAPITAL: THE POTENTIAL OF TECHNOLOGY FOR RURAL TEACHERS PROFESSIONAL LEARNING IN SCOTLAND

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Abstract

Professional learning opportunities for teachers working in rural settings can be restricted by the time, distance and cost involved in accessing face-to-face events. The expansion of internet connectivity to rural areas provides new ways for rural teachers to engage with professional learning. This study explored the experiences of rural teachers in the north and west of Scotland at a time when internet connectivity was being expanded in rural settings. Analysis focused on the mediating role of technology in relation to its capacity to enable or restrict the flow of capital. The findings highlight the potential of technology for professional learning in rural areas. The gains are exponential compared to their urban counterparts as technology can enable access to the professional community, previously constrained by geography. The gains are not automatic though. While technology *can* enable the flow of capital in rural areas, it also mediates it. Understanding the mediating role of technology and the experiences of rural teachers when engaging with it, are important considerations for both future research and those working to deliver or provide professional learning opportunities for teachers in rural schools.

Keywords: Technology, Mediation, Professional Capital, Professional Learning, Rural

Introduction

The role of the rural teacher and their engagement with professional learning is important to communities across the globe. For teachers working in rural settings, access to professional learning opportunities can be a challenge. Rural teachers, like rural children, should not be excluded from access to quality learning environments because of the geographically isolated settings in which they work (Halsey, 2018).

Rurally based teachers are often required to travel much further than their urban and suburban counterparts to access training courses or attend professional network meetings (Glover et. al., 2016). Digital participation has the potential to enable greater equity of access by providing alternative ways for rural teachers to engage with professional learning activities (White, 2016). However, the implications of digital inclusion for rural teachers are not yet fully understood (Hunt-Barron, Tracy, Howell & Kaminski, 2015). This study focused on the experiences of rural teachers in the north and west of Scotland, exploring their experiences of professional learning as the 'roll out' of rural broadband improved connectivity across the region.

Internationally people living in rural locations are less likely to have good levels of digital connectivity (Odero & Chinapah, 2016; Phillip, Cottrill, Farrington, Williams & Ashmore, 2017). In many rural areas of Europe, broadband coverage is lower than in urban areas with less than 40% of rural European Union households having access to next generation services (European Union, 2017). Digital connectivity can provide opportunities for professional development which mitigate geographical distance (Seely Flint, Albers & Matthews, 2017) - one of the key factors influencing rural teachers access to professional learning opportunities (Glover et. al., 2016).

This study captured the voice of the rural teacher (Hargreaves, 2017; Roberts, 2017), exploring their experiences of professional learning with a focus on the role of digital connectivity in rural and remote areas. In Scotland professional learning opportunities for teachers are mainly delivered by Local Authorities, Government agencies and Universities. Local Authorities are organised geographically and are responsible for supporting schools and teachers within a specific area. The teachers in this study worked in local authorities (LAs) which were predominantly rural and remote, including highlands and islands. Professional learning was interpreted broadly, as any activity which developed teachers' practice. The study highlighted the potential of digital connectivity for professional learning in rural settings and identified factors which require close consideration.

Context: Rural Scotland

Scotland's rural areas incorporate a variety of geographical landscapes and a range of community types. The regions of the north and west are rural and remote with mountainous scenery and rugged coastlines. While there are some larger towns and a small city the area is predominantly made up of small villages and rural dwellings. The Scottish government definitions of rurality were used in this study; rurality is classified in relation to the size of settlement and distance from an urban centre (Scottish Government, 2016). Travel around the north and west of Scotland can be challenging as the physical infrastructure is limited. Due to the mountainous landscape road travel can be time consuming and a limited rail network covers some of the area. Travel is also difficult to and from the islands with limited links by plane as well as ferry. This study did not include the Western Isles or the Orkney or Shetland Isles, the experiences captured in the interviews related to the smaller inner isles, which are part of the mainland local authorities.

Broadband connectivity in the highlands and islands is expanding, reflecting rural areas worldwide (Phillip, Cottrill, Farrington, Williams & Ashmore, 2017). However, in Scotland the roll out of rural broadband is challenged by sparsely populated mountainous rural areas and distributed island populations. Coverage in the Highlands and Islands region increased from 4% at the beginning of 2013 to 86% in 2017. The current aim is 100% coverage by 2021 (HIE, 2017), reflecting wider EU initiatives (European Union, 2017). The digital infrastructure has significantly improved in the last few years. However, as in Europe, North America and Australasia, a digital divide between urban and rural areas is evident (Phillip, Cottrill, Farrington, Williams & Ashmore, 2017).

Rural schools and Professional Learning in Scotland

In Scotland there is currently little research exploring the professional learning experiences of rural teachers. Rural schools are generally small and primary school teachers often work with composite (mixed age or multi-grade) classes. Secondary school departments are likely to be small and some teachers will work in single-teacher departments, being the sole provider of their subject-expertise within the school. In instances where subject-specialists are unable to be recruited, teachers from other schools may teach cohorts of pupils through online platforms or e-schools (Comhairle nan Eilean Siar, 2019).

Scottish teachers are required to engage in professional learning as an ongoing aspect of their professional practice (Scottish Government, 2011). This is described by the General Teaching Council for Scotland (GTCS) as: “what teachers engage in to stimulate their thinking and professional knowledge and to ensure that their practice is critically informed and up-to-date” (GTCS, n.d). Professional learning also forms a key part of the professional review process. To teach in Scotland, teachers are required to be registered with the GTCS. In order to stay registered, teachers have to engage in professional update every five years, evidencing their professional learning against one of the GTCS professional standards (GTCS, n.d). Engagement with professional learning is therefore a key aspect of Scottish teachers’ practice. For teachers in rural schools geographical isolation potentially limits their ability to access quality professional learning opportunities such as courses or network meetings and in turn may impact re-registration (Glover et. al., 2016).

The Potential of Technology

Anecdotal evidence suggests that the experiences of rural teachers in Scotland are similar to their worldwide counterparts: rural teachers tend to have a wider role in school life (Tieken, 2014), have strong community links (Gallo & Beckman, 2016, Hargreaves, 2017, Kvalsund & Hargreaves, 2014) and are more likely to teach composite or multi-grade classes (Greenough & Nelson, 2015). Rural schools face challenges with recruitment and retention of teachers (Cuervo, 2016, Halsey, 2018; Hargreaves, Parsley & Cox, 2015,). Rural teachers in the highlands and islands of Scotland often live and work at a distance from centres where training courses and network meetings are facilitated. Accessing professional learning resources and playing an active role in professional networks may therefore be hampered by distance and time, reflective of rural contexts worldwide (Hargreaves, Parsley & Cox, 2015; Ledger, Vidovich & O’Donoghue, 2015).

At a time when broadband connectivity is developing quickly the experiences of Scottish rural teachers engaging with technology for professional learning, may be relevant to their counterparts in rural contexts worldwide. Rural schools educate ‘high proportions of the world’s children’ (Hargreaves, 2017) so the professional learning and development of rural teachers impacts on high proportions of the world’s pupils. Technology has the potential to overcome barriers of distance (Seely Flint, Albers & Matthews, 2018) and to enable rural teachers to be actively involved in professional networks (Forbes, 2017, Hargreaves, 2015).

This qualitative study captured the voice of rural teachers and explored their lived experiences of professional learning, learning communities and professional knowledges. The research questions posed in this study were as follows:

How do teachers in rural schools in Scotland access professional learning?

To what extent does digital connectivity enable rurally based teachers to engage with professional learning?

In what ways does technology mediate engagement with professional learning, formal and informal, in rural areas?

Theoretical Framework

Learning is a social process (Bruner, 1996, Freire, 1996, Vygotsky, 1987) which takes place in cultural spaces (Bourdieu, 1996, Lave, 2008, Wenger, 1998). Teaching is a social process and professional learning for teachers goes beyond individual development. Teachers are members of a professional community of practice which is shaped by the participation of its members (Lave & Wenger, 2002, Wenger, 1998). Professional learning takes place within a community of practice influenced by wider discourses and policies shaped by the actions of its members.

Negotiating the meaning of what it is to 'be' a teacher involves self-awareness and interaction within the teaching community. The values and beliefs of the professional community within a workplace provide access and insight into the knowledge and understanding that shape pedagogic practices and choices. Professional learning can therefore be understood as a process of negotiating meaning and developing identity, through participation within the professional community (Wenger, 1998). For teachers in rural areas, interactions with other teachers in their professional community may be limited. However, teachers remain active members of the larger community in which they are positioned through everyday practice and interactions. Changing policy contexts and initiatives are filtered through to teachers through various lines of communication, interaction and reflection (Kemmis, 2016).

When participation is enacted through technology, through a video conference or a webinar connection, it is embodied by technology (Dourish, 2001). This technology is mediating the participation (Cetina, 2008). This mediation helps explain the feeling that online interactions for participants just 'aren't the same as face-to-face', can be understood. When technology is enabled through digital mediums it embodies the interaction (Dourish, 2001) and influences teachers' experiences of learning when participating with others. Technology mediates the negotiation of meaning and enables interaction at a distance. It acts as the medium for interaction while also affecting the participants experience of the interaction. Consequently, this research engaged with mediation (Vygotsky, 1987, Wertsch, 2007), enabling the research to develop a deeper understanding of the role of technology in the rural professional learning context.

Mediation is a recurrent theme in Vygotsky's work (Wertsch, 2007). Tools, both physical and cultural, shape practice. Mediation is observed by Wertsch (2007) as both explicit and implicit. Explicit mediation- visibly and often purposefully - influences the development of higher mental functioning, e.g. teaching students a subject-specific vocabulary. Implicit mediation is not visible, access to a set of cultural beliefs modelled by a teacher may influence a student's understanding of the world tacitly. Technology mediates our participation in today's world (Cetina, 2007). It influences how we interact with others and with the world (Dourish, 2001). Physical technology such as computers, tablets and phones act as mediating artefacts. They combine the functions described by Vygotsky as physical and cultural tools and act as carriers that affect messages (Vygotsky, 1987).

Professional learning relies on the transmission of pedagogical and cultural messages to enable teachers to develop and enhance their practice (Kemmis, 2016). It also develops the professional community of teachers as knowledge and understanding flow around the community, benefitting both the individuals within the community and the community itself. To explore the flow of this knowledge and understanding this research also engaged with theoretical frameworks of 'capital'. Theories of social and professional capital enable exploration of the flow of 'meaning' around the professional community and rural teachers' access to, and active interaction with it. Technology has the potential to enhance and enable the flow of capital around the professional community as rural teachers are able to be connected with their peers in networks and join professional learning activities mitigating the constraints of geography (Hargreaves, Parsley & Cox, 2015).

The pedagogic skills, philosophies, knowledge, values and beliefs of the professional teaching community of practice can be observed as capital accessed by teachers and school-based professionals through the processes involved in professional learning (Grossman et al., 2009). The concept of social capital addressed by Bourdieu (2010) explains the role of social space as involving the structuring of, and structured by, practice. Extending this idea, Hargreaves and Fullan (2012) develop the idea of 'professional capital'. In professional communities of teachers

individual practice is shaped by engagement with the values and beliefs of the wider professional community in which it is positioned. Access to values and beliefs enables teachers to keep up-to-date and abreast of pedagogical changes and can influence the ongoing development of the individual and professional community. Professional capital - human, social and decisional capital - is identified as a facet of high achieving school systems (Hargreaves & Fullan, 2012). Human capital, the individual capacity of a teacher, is developed by professional learning as professional learning “*build(s) the capacity of teachers (to develop) their pedagogical expertise*” (Scottish Government, 2011). Social capital, the networks and relationships of the teaching profession, is also developed through professional learning as it often involves interactions with professional peers. Development of human capital and access to social capital can both be hampered by the geographic, economic and demographic challenges teachers face when living and working in rural school contexts.

The role of the internet in the formation of social capital has been explored within USA (Norris, 2002). The study, demonstrated the potential of online access as a means of enabling the flow of social capital. With the roll-out of rural broadband in Scotland the digital landscape is providing a new setting for rural teachers to access different forms of capital. Professional learning, as it is defined in Scotland (GTCS, Scottish Government), can be observed as a process which enables the flow of capital around the network, thus being a social as well as an individual activity. The manner in which teachers in rural Scotland access and engage in professional learning and the mediating role of technology within this flow of social and professional capital, is explored.

Methods and Methodology

An iterative qualitative methodology was employed to both capture the voice of the research participants and ensure that the researchers own perceptions and bias were reflexively acknowledged and did not unduly influence the results. This reflective process enabled critical engagement with the complex nature of rural living (Corbett, 2015) and engaged with the situated knowledge (Roberts, 2014) of those living and working in rural settings. Research exploring rural education highlights the importance of rural ‘place’ (Baeck, 2016, Kvalsund & Hargreaves, 2014, Reid et. al., 2010); place being conceived in relation to ‘*structural, social and cultural*’ processes (Baeck, 2016 p. 435). This research engaged with the complexity of rural ‘place’, exploring the cultural, social and structural factors as mutually constituting elements of the lived experience. The researcher was based in a university serving a distributed and largely rural area of Scotland. The lived experiences of the researcher were rural, situating – rather than abstracting (Corbett, 2015) – the analysis. The analytic process ensured that the lived experiences of participants were a central aspect of the research throughout the methodological process, acknowledging and valuing the voice of rural teachers.

Eighteen teachers working in rural settings across the North and West of Scotland were interviewed. These teachers were working in schools identified and listed by the Scottish government as being ‘rural schools’ (Scottish government, 2017). Interviews were semi-structured and conversational in style, co-constructing understanding between the researcher and research participants (Gubrium & Holstein, 1998, 2012). Participants worked in Primary and Secondary schools, Early Years settings and Local Authorities, with varying lengths of teaching experience between one and eighteen years. Participants were invited to take part in the study through University Teacher Education partnership connections. The researcher asked members of this partnership to identify potential participants; teachers working in rural areas. Inclusion in the study was pragmatic, participants who volunteered were interviewed. Interviews were carried out either in person or by phone, dictated by distance from the researcher and the participant’s preference.

The interviews were manually transcribed. Each participant was given the opportunity to check the manuscript before analysis with names of people and places being removed to ensure confidentiality of participants. The rich textual data set was iteratively analysed by a single researcher, initially identifying themes and subsequently exploring each theme in detail (Miles, Huberman & Saldana, 2014). This process enabled the researcher to revisit each interview multiple times and to draw out the key findings. The richness of individual experience was captured by the inductive approach as variations and contrasts. Similarities of participant experiences were also identified. Methodological rigour was ensured through identifying and coding all relevant experiences and perceptions, including outlying data, inherent tensions and contrasting reports (Miles et al., 2014). In an ontological sense this acknowledged the social, cultural and physical structures which make up the social world, without fitting pre-defined themes onto the empirical data set.

Analysis of the interviews was thematic and iterative. Initial coding identified themes (Figure 2):

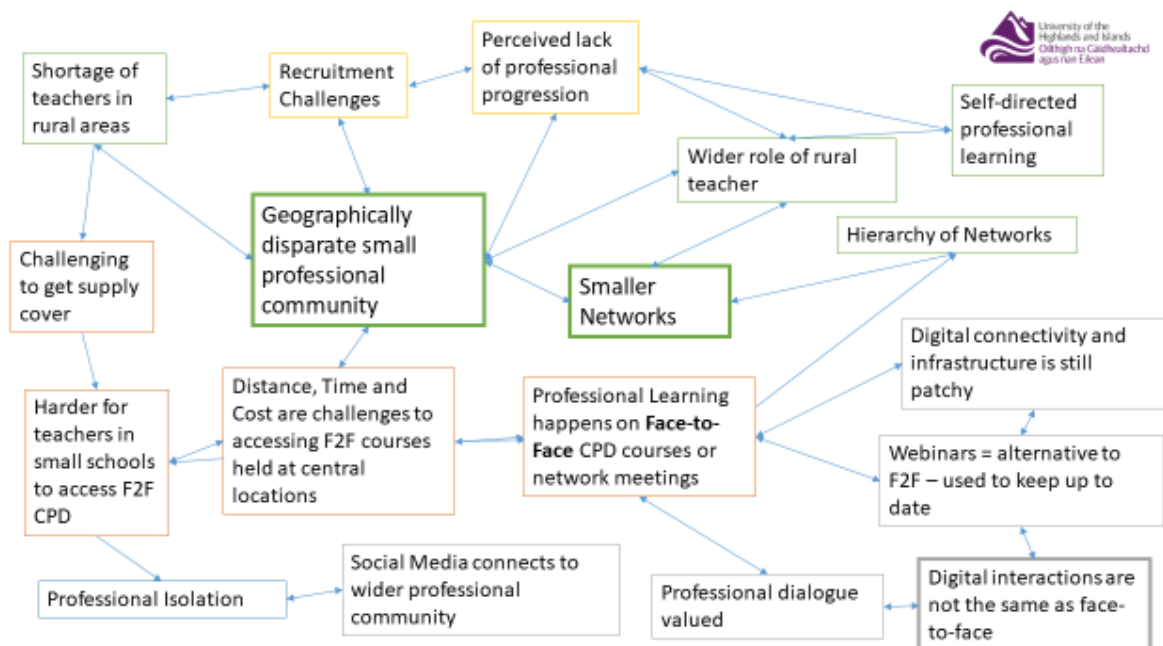


Figure 1: Themes emerging from initial analysis of interviews

The theoretical lenses of mediation and capital were applied following identification of the themes and exploration of their connections, many of which were complex. Critical analysis of the initial findings using the theoretical lenses enabled meaning to be negotiated and themes to emerge. The researcher critically evaluated the themes and their connectivity at individual and community levels and in-depth investigation into factors that may have impacted responses. This led to a critical reflection on the potential of technology, highlighting its role as a mediating artefact which both enabled and constrained the flow of capital (see Discussion).

Ethical Considerations

This research acknowledged and valued the importance of rural voice (Hargreaves, 2017). It captured the experiences of rural teachers in Scotland through their own words and from their unique perspectives (Anderson & Lonsdale, 2014). Following the interviews, the qualitative thematic analysis enacted responsibility as the researcher ensured that all voices were heard, actively valuing all participants. The methodology positioned the research in a reciprocal framework, the analysis continuing to construct a dialogue between the researcher and the participants.

Names and places were removed from the transcripts. Quotes from interviews were not referenced to a particular interviewee to ensure confidentiality of participants. Evidence – recordings and transcriptions – were stored securely and destroyed following completion of the research. Consent was given by all participants and the research was approved by the University ethics committee.

Findings

The findings are presented as a narrative to capture the complexity of the lived experiences of rural teachers in the north and west of Scotland. Quotations from interviews value the voice of the rural teacher but are not attributed to safeguard the confidentiality of participants. The research questions start each section of this narrative. The data were rich and captured a wider sense of the rural experience than the questions anticipated. The following narrative reflects this by moving beyond the initial questions:

1. How do teachers in rural schools in Scotland access professional learning opportunities?

Opportunities for professional learning were provided by the Local Authority (LA). These opportunities were often face-to-face in centrally located settings and were thus challenging for rural teachers to attend due to distance, time and cost:

“We’re at the bottom of the valley so you just don’t go to certain things”

“Being in a rural school the opportunities are often so far away that its travel expenses as well as the time and potentially accommodation”

When rural teachers were able to travel to a face-to-face event they often struggled to find teachers to cover their classroom responsibilities. While this may also have been experienced in urban areas sparser populations accentuated the problem as fewer supply (relief or substitute) teachers are available. In addition to the travel difficulties, visiting experts were less likely to come to rural or remote areas. A decline in the provision of professional learning opportunities was observed:

“It’s become less and less over the years. It used to be there were lots of opportunities”

The geographical dispersal of schools also limited opportunities for progression or promotion as opportunities were limited locally and smaller schools required less promoted staff. And yet, juxtaposed against a lack of employment opportunities was a shortage of staff: *“We’ve always found it difficult to recruit”*. This tension highlighted the complexity of the rural context and the impact of geography in attracting recruits, substitutes and the subsequent smaller and disparate professional communities.

Rural teachers often carried out a wide range of duties in school. Without the staffing structures of larger schools, rural teachers had more autonomy over their classroom practice, they had the capacity to be agentive.

“Being in a rural school gives you lots of opportunities to do things and try things your own way”

But, the capacity to be agentive, when it came to professional learning could feel like they were constantly; *“doing it off their own back”*. This has implications for professional capital. Rural teachers, working in small schools, had a smaller local professional peer group and so face-to-face professional learning opportunities were valuable ways to engage in professional dialogue. Rural teachers often benefited from strong community links but in contrast to this, they felt professional isolation more acutely. Professional networks were observed to have the potential to provide rural teachers with access to a wider range of professional peers but were difficult to

achieve. Engaging in a professional network could be a challenge for rural teachers because of time, distance, cost and lack of coverage.

Opportunities for professional dialogue with the wider professional community were valued by rural teachers but the smaller population size of the teaching community in rural areas effected teachers' access to professional networks. Different types of professional networks were available to teachers in Scotland. Head teachers and principal teachers were supported in their leadership roles through access to networks of peers, which helped overcome any sense of isolation from colleagues at school. However, in rural areas all teachers were likely to be working in the same kind of isolation. The size of school teams impacted on rural teachers' access to networks organised by Local Authorities. Local Authorities organised networks for selected staff to attend which were based around discipline, curriculum and practice development. Schools choose a teacher from their school to attend each network. In small rural schools capacity was quickly used up, as teachers found themselves playing a much wider role than their counterparts in larger urban schools. While a staff team in an urban school could assign one staff member to each network, in small rural schools staff members were often assigned to multiple networks.

Distance was a significant factor which influenced rural teacher's access to professional networks when networks were facilitated in face-to-face settings.

2. To what extent does digital connectivity enable rurally based teachers to engage with professional learning?

Technology has a role to play in enabling access to networks as well as training events for rural teachers. Recent broadband connectivity in Scotland has seen technology beginning to be utilised more in the professional learning space. However, even with the roll-out of rural internet, connections were still inconsistent and unreliable, particularly in rural north and west of Scotland. Whilst some schools had excellent connections, others did not. There were also wider factors that influenced teachers' engagement with technology. Confidence and previous experiences influenced teachers' use of technology to engage with professional learning. The delivery and facilitation of online events and the tools available impacted on the value of the online resource or activity. The proliferation of professional learning opportunities online in itself created a barrier to participation:

"It's not that there isn't enough opportunity online, the issue is filtering the best opportunities"

Some teachers engaged with social media to access professional groups, collaboratively or individually, connecting to wider dialogues:

"That is one of my big things actually, there is a national group on Facebook ... it's a really nice forum for sharing ideas and resources ... I am a wee bit isolated where I am"

"There's actually a fairly lively number of teachers in Local Authority B who are on Twitter ... engaging in dialogue ... as well and sharing ideas"

Social media enabled rural teachers to connect with each other and the wider professional community. The use of specific social media platforms for professional learning related to the Local Authority in which the teacher was based. Twitter was dominant in one Local Authority area:

"I use Twitter a lot and most teachers within this authority, and that was something I hadn't come across in other authorities much"

While in another Local Authority teachers identified the preferred social media as Facebook:

“I do use Facebook, there is a Facebook page set up for ..., which people use to share good practice and ideas.”

“I’m so rubbish at looking at Facebook”

Local Authorities actively promoted the use of social media platforms, but it was not clear whether this influenced the teachers’ choice of network or if it was in response to the platforms local teachers used. Participants in general commented that social media provided access to ideas and resources and supported isolated professionals. Not all teachers were engaged with social media though. It was associated by some with feelings of guilt - that one shouldn’t be on Facebook while at work – and impacting on their work-life balance. Rural teachers identified a positive work-life balance and many actively choose to work in rural schools because of this. Social media and e-mails, had the potential to impact as it was accessible at home and out of work hours:

“I go home and I’m on Facebook, like work!”

In Scotland GLOW was the national intranet for schools, hosting resources and information which teachers could access (Scottish Government, n.d). However, previous poor experiences with the platform were still a barrier to teachers’ current engagement, even though the new platform was much better. Findings showed differences between access and engagement related to past experience and confidence in using the platform.

Videoconferencing (VC) was being developed in rural authorities as a means to provide access to professional learning. The video connection enabled engagement from a distance but required more than just a good internet connection. When rural teachers joined a VC session they were often sitting on their own, or in a small group. Depending on the screen size of the console available they were able to see small images of other participants, or just faces. Often rural teachers would be invited to ‘VC’ into a session being delivered to a local group. All of these factors accentuated, not the connection to the wider discourse, but the distance rural teachers were from it. While distance was mitigated by VC connections isolation was not necessarily. Carefully facilitated sessions negated this and through actively engaging with all participants dialogue was able to be supported and enabled but teachers described the experience as a poor comparison to face-to-face dialogues.

3. In what ways does technology mediate engagement with professional learning, formal and informal, in rural areas?

While technology provided the means to connect teachers, the inconsistent connectivity and a perception that face-to-face interactions were better, led to a perception of potential rather than actuality:

“Yes, I think we need to get better at how we use the video conferencing”

“I think we need to investigate... ways to use technology to support people in rural isolated areas”

“I mean it is important that we do think about these things and that we do use the technology to support people better”

For rural teachers’ technology provided the means to access resources and courses, connect to the national dialogue and engage with professional networks. However, it was perceived as challenging to create professional dialogue through an online space: *“It’s actually really, really difficult because you can’t beat the professional connection that you get with people when you physically sit in the same room as them and have a conversation”*. While videoconferencing aimed to provide an online space for professional dialogue and interactions, the teachers experience

wasn't always positive. The videoconferencing technology influenced the interaction and "you do miss something compared to face-to-face, the conversation just doesn't flow naturally". The lack of non-verbal and para-verbal cues negatively impacted the dialogue as "you miss something if you don't see the nuances of people's faces". Face-to-face experiences enabled teachers to get a better sense of each other as people. When contact took place through a digital connection such as videoconferencing the interaction changed and was often perceived as somehow lacking.

Technology was not something that all teachers were comfortable with, many lacked the confidence or skills to engage:

"I mean technology isn't my area of expertise"

"There's a lot of teachers who have never needed to use technology and then suddenly it's there"

"There's also a whole subset of skills that lots of teachers don't have ...IT skills ... as a profession they are not universally inculcated"

There was a perception of generational change, an assumption that younger teachers, and pupils, were more competent with technology:

"I think younger teachers are doing that already ... they go away and play with it at home"

"Children, there's no problem they just do"

In rural schools, where the turnover of staff may be slower or challenging this generational gap had a potential impact as younger teachers, when they did join a school, might move through quite quickly.

Social media provided access to the resources of the wider professional community and rural teachers used platforms to share resources and ideas, such as Facebook and Twitter – in similar ways to their urban counterparts. Dialogue on these platforms provided support: "a really good place ... there's always somebody who will have some good ideas or suggest places that you can go", enabling teachers to engage with their peers at a distance. Meaning could be negotiated through social media as teachers accessed the resources, philosophies and opinions of a wider group of professional peers. It could, however, accentuate negative feelings about the profession as online spaces provided platforms for negative voices of disgruntled practitioners. Engaging with social media platforms challenged work-life boundaries as it could be accessed outside of the professional workspace.

Discussion

Professional learning, as described by teachers in this study and in the Scottish national descriptors (GTCS, Scottish Government), is a process which involves accessing capital and personal development. Teachers develop human capital through access to learning opportunities and interactions with others. As has been shown in previous research (Hargreaves & Fullan, 2012), human capital requires social and decisional capital if it is to successfully impact pupil learning, the core aim of teachers'. In rural areas the flow of professional capital is altered by the geographical spread and small size of the professional community (Ledger et al., 2015).

Technology has the potential to enable the flow of professional capital across rural professional communities, in doing so it mediates the flow, influencing the negotiation of meaning. Ensuring access to professional capital for rural teachers therefore requires consideration of the nature of the professional community in rural areas and the mediating role of technology.

Reflecting initially on the flow of capital, the size and geographic spread of the rural professional community directly influences that flow. As highlighted in the previous section, rural schools

often have smaller groups of teaching staff, meaning there are fewer conduits for capital. With fewer conduits there is less opportunity for capital to be accessed and shared. In urban settings networks of head teachers provide a means for professional capital to flow into school settings, and in turn flow around the school as initiatives or pedagogic developments. While this also happens in small rural schools the flow of capital in a small school may have less force. A Head teacher disseminating information to one or two teachers is very different to a group of eight or ten. Not only is the flow smaller it can result in possible power inequities and conflict (Ledger et al., 2015). In Secondary schools the staff overall may be bigger but at department level single teachers will likely produce a lesser 'flow' of capital than is afforded by groups of teachers working together.

The flow of capital and individual teachers' access to social capital, can be hampered by the size of rural schools. This, however, can also provide greater choice in relation to professional development. The wider role of the rural teacher (Tieken, 2014) is reflected in their engagement with professional learning. While small rural schools may have less capacity to engage with the variety of external networks available, teachers experience a greater level of self-direction: their decisional capital (Hargreaves & Fullan, 2012) is high. Technology has the potential to support choice, enabling rural teachers' agentive engagement with professional learning of their own determination. Agency is afforded to rural teachers by school size as there is less need to focus on 'fitting in' to wider school initiatives. This enables rural teachers to be more agentive in their pedagogic developments as while they might not have the support of a local professional peer group, they are also not required to fit in with them. However, online professional learning opportunities are not filtered in the way that face-to-face opportunities are. While the online space enables access to a wealth of courses and reading for some rural teachers the choice is considered too wide for some. The task of trawling the internet for opportunities becomes unfruitful and time-consuming. Larger local peer groups are able to process some of the filtering required to fully utilise the potential opportunities the online space provides. The proliferation of online resources and activities does not automatically provide greater opportunity for rural teachers but rather, these changing practices compound choice and highlight challenges (Ledger et al., 2015).

Congruous with previous research findings this study observed the complex relationship between rural teachers professional learning and their access to forms of capital inherent in the wider professional community. Schools play an important role in local communities (Tieken, 2014: 158) and this is reciprocated by active community engagement with rural schools (Hargreaves, 2017). Teachers in rural school's work with local communities who are close-knit and often actively involved with the school, the smaller size and geographical isolation of rural communities perhaps influencing this. The local community, the local place, influence the professional context in which rural teachers' work; place and context matter (Corbett & White, 2014). Strong rural communities contain capital in local groups who already share values and beliefs (Bagley, 2017), the flow of capital beyond already established perspectives being limited. Access to the wider professional community, through online platforms such as Twitter, lessens rural teachers' feelings of disconnect and enables them to act as conduits of capital, impacting on the local communities in which they teach. Internet connectivity and digital technology has the potential to provide teachers access to the social capital of the wider professional community, from within the rural place in which they are working. One of the advantages of technology is connectivity to the wider professional community. Using digital tools does not require rural teachers to physically leave their local community.

The potential of technology for rural teachers is arguably clear as it can negate the barriers of distance, time and cost of professional learning for teachers. It has the potential to mediate the flow of capital, build human capital and enable the flow of social capital within these locations. Decisional capital can be enacted through autonomy of choice in relation to professional

learning. Using technology to access professional learning and thus enable the flow of capital requires engagement with artefacts (digital tools) which mediate participation. While technology can help achieve rural transformation (Odero & Chinapah, 2016) the core requirement of using it effectively (Hargreaves et. al., 2015) is perhaps not as straightforward as could be assumed (see Findings). The concept of digital natives (Prensky, 2001) has been largely debunked in the academic literature (Helsper & Eynon, 2010), but in this study there was a perception of generational difference. Pupils and younger teachers were perceived to be more confident with technology but not more discerning. This potentially reflects the slow flow of professional capital around the rural professional community. Technology can be perceived as a tool, in the physical sense, which requires the development of certain skills. It can also be perceived as a cultural tool reflecting changing values and creating emotive responses from teachers, in relation to their own competencies with technology.

Technology mediates participation by enabling interaction and stimulating resistance to its use. In areas where there has been a lack of internet connection, or the connections are relatively new, and there are smaller groups of staff, the availability of internet connection may influence experiences as the opportunity to connect hasn't been there. With smaller staff teams when that opportunity is realised the skills or capital to use it effectively do not immediately flow into the area.

Social media provides a platform for teachers to engage with the wider professional community, enabling teachers to connect with like-minded peers through engagement with common interest groups (Norris, 2002), thus enabling the flow of social capital. However, the nuances of dialogue are lost (Beth, Jordan, Schallert & Reed, 2016) and it is not yet known to what extent this impacts the negotiation of meaning. Social media platforms mediate participation through the associated practices of specific platforms, these often include explicit and implicit rules for dialogue, concise posts and re-shared content. The para-verbal and non-verbal cues (Laffey, Lin and Lin, 2006, Slagter van Tyron & Bishop, 2006, 2009), the utterances of face-to-face dialogue (Beth, Jordan, Schallert & Reed, 2016) are lost in the - often - mobile phone-based interactions. Filter-bubbles (Berners-Lee, 2014) increase the potential of echo chambers which arguably have the potential to stunt the flow of social capital or the development of human capital. Negotiation of meaning may be influenced by these factors, causing stagnant pools of frustration or accentuating viewpoints without experiencing a wider perspective. These factors may have influenced the differences in attitudes and use of social media by rural teachers for professional learning observed in this study. Further research on the impact of social media in relation to teachers' professional learning would enable exploration of the mediating role of social media.

While social media provides opportunities for rural teachers to access social capital, it operates across work-home boundaries (Van Zoonen, Verhoeven, & Vliegenthart 2016). Working in rural schools in north and west Scotland affords good work-life balance but also brings with it a loss of anonymity. Social media can blur boundaries between work and home. In a setting where work and home potentially have blurry boundaries physically, social media has the potential to open up spaces which require careful negotiation. Technology challenges traditional notions of space and time (Dawesar, 2012). The impact of this in rural places, where boundaries are already less clear in relation to teachers work and home lives, is important to consider. The value and use of social media may be influenced by the spaces it opens up as well as teachers' ability and desire to engage.

Video conferencing provides opportunities for rural teachers to engage in professional dialogue with geographically distant peers. When engaging in dialogue the non-verbal and para-verbal cues, discussed above, are significant elements of face-to-face interactions (Beth, Jordan, Schallert & Reed, 2016, Laffey, Laffey, Lin & Lin, 2006, Slagter van Tyron & Bishop, 2006), these can be lost or masked in VC discussions. Factors such as VC facilitation and organisation can

accentuate, not the connection to the wider discourse but the distance rural teachers are from it. The meaning which is negotiated during technology sessions may accentuate the isolation of rural teachers as their position outside of the central discourse may be implicitly emphasised. Technology influences the experiences of participants as physicality is removed and dialogue is experienced through a 2D screen. However, findings showed that connectivity is still inconsistent across rural areas of Scotland and so rural teachers cannot rely on always being able to connect into VC sessions. For those delivering professional learning VC delivery requires extra work on the part of the presenter and the mediating role of the technology means that they are not automatically inclusive. The technical infrastructure and rural connectivity can produce poor quality links and delays when sharing resources. These factors can impact on the experience of participants. Rural teachers value the opportunities they have to engage in dialogue with peers, particularly because the challenges of distance, time and cost has led to a recent decrease in these opportunities. VC has the potential to enable spaces for dialogue, but it mediates the dialogue differently to face-to-face interactions.

For teachers a barrier to VC use was potentially the perception of it being a cheaper alternative. In the context of cutbacks to professional learning opportunities the potential of VC connections in relation to negating distance, was juxtaposed with a perception of them being a cheaper alternative, therefore reflecting a lack of value in the investment given to rural teachers' professional development. The potential of technology to connect teachers in rural areas is huge. Consideration of the mediating role of technology in this context is important though, if technology aims to enable the flow of capital and provide spaces for professional dialogue.

Conclusion

Technology provides the potential for an exponential gain in relation to rural teachers' access to professional learning opportunities. Rural teachers have opportunity to join professional learning sessions using VC connections and engage in professional networks using online and social media tools. Access to the professional community -which time, distance and cost have previously limited - has the potential to be realised through the effective use of technology. The flow of capital through the professional community can be further enhanced and enabled through increased technological connectivity which provides a platform for individual and communities of practice in rural areas.

Technology was found to mediate the flow of professional capital in a number of ways in rural Scotland, implicitly and explicitly. Appropriate tools and good internet connections are important considerations. So too are the skills required to interact online, both to deliver professional learning opportunities and to connect to professional networks. Understanding the mediating role of technology supports those working in the field to develop effective professional learning opportunities and understand the experiences of rural teachers. This will enable the development of inclusive and equitable opportunities for the rural professional community. There are currently examples of effectively facilitated online professional learning opportunities in Scotland, but they are not yet accessible to *all* teachers, particularly those in rural schools. Future research and continuing technological advancements may provide opportunity to enable rural teachers to further develop personal, social and professional capital within and beyond their local community. Moreover, the voice of rural teachers may be better mediated via technological connections that enable them to contribute to national policy and practice discourses.

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