Navigating the Digital Landscape: Teachers' Digital Repertoires in an Under-Resourced Cape Flats Primary School

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Contents

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List of acronyms

NLS: New Literacy Studies

DBE: Department of Basic Education

4IR: Fourth Industrial Revolution

ICT: Information and Communication Technology

UNISA: University of South Africa

IWB: Interactive Whiteboards

IRF: Initiate-Response-Feedback

SMT: Senior Management Team

Abstract

This small case study examines the digital repertoires of two teachers in a Cape Flats Primary School as they attempt to *take hold* of digital resources and integrate them into their daily teaching practices. It draws on the interconnected socio-material theories of spatiality, assemblage and affect to provide a framework within which their entanglement with digital technology in an educational setting can be observed, described and analysed. The research focuses on the simultaneous array of challenges and opportunities which the teachers navigate in the process of acquiring, using and adapting a range of resources across various semiotic modes in the classroom space. This space is conceptualised in the study as a dynamic ecosystem where social, material and affective factors dovetail. It is also here where the digital repertoire emerges *in situ,* lying at the intersection between the teachers' skills, knowledge and experiences with technology and the material resources, infrastructure and cultural practices that exist within their school domain. The notion of the digital repertoire offers this study a dynamic lens through which to view the complexities, contradictions and tensions that arise as the teachers struggle to to align their literacy practices and pedagogical approaches with their developing repertoires. This study challenges neoliberal ideas in which technology is viewed as a *panacea* for a South African education system uniquely skewed along the lines of social class, race, ethnicity, income, age and gender. It is critical of the kinds of deterministic thinking that currently influence digital intervention policies and strategies in South African education precisely because such determinism sacrifices socio-material context in favour of technical skills. In contrast, drawing on findings from the research, this study advocates for an approach to the integration of technology in classrooms that recognises the dynamic interplay of human agency, material resources and social contexts in shaping teachers' digital repertoires. The findings of this study therefore emphasise the need for personalised, context-aware and participatory professional development that empowers teachers to critically evaluate and meaningfully integrate technology into their teaching practice.

Chapter 1 Introduction

The twin-package of the internet and digital tools have fundamentally reshaped existing ideas of what language and literacy is, what it means to be literate and how we learn. New Literacy Studies (NLS) explain this shift towards the digital as evidence of the fact that people can and do "take hold of literacy in ways (agentic) that are consistent with their backgrounds."(Kell, 2018: 1) When this occurs, literacy practices can be thought of as continuously reinvented and modified, "emerging out of a messy array of diverse materials, bodies and impulses." (Burnett and Merchant, 2020: 354). In this 'messy array' Mills (2015) points out for example that hybridisation of textual practices takes place in various cultures and subcultures as people "reinvent and modify literacy practices with digital technologies for different social purposes… unforeseen by their designers" (Mills, 2015: 32)

In this context, this thesis is a study of the diverse ways in which teachers, operating within the school domain, materially *take hold* of digital resources and integrate these into their daily teaching practices. The act of 'taking hold' requires an understanding of how teachers acquire, use and adapt different semiotic resources (both in and out of the classroom), while navigating through an ephemeral digital world. In order to provide deeper insight into this process, this study draws on the notion of the *digital repertoire* (Darvin, 2018a) which can be conceptualised as the collection of all meaning-making resources that people acquire, produce, use and discard over time as they move through space in a transient world. The repertoire offers a dynamic lens through which to view the complexities, contradictions and tensions that unfold as a consequence of teachers' entanglement with technology.

Teachers' digital repertoires are viewed as *emergent* in this study because the constantly changing digital landscape requires digital skills and practices to be dynamic and adaptable in order to stay relevant. As teachers seek to leverage diverse resources in their digital practices, the repertoire reflects individual agency. The extent of this agency however, is heavily influenced by the socio-material context of the school domain and the physical spaces in which teachers work. This context includes not only the material infrastructure, such as the availability of digital tools and internet access, but also the prevailing social and cultural environment.

This study seeks to understand what happens to pedagogic practices when, despite facing personal and material constraints, teachers attempt to express their repertoires by drawing on available resources. These resources are viewed as not being confined to a single mode, such as spoken or written language, but rather as encompassing a variety of semiotic modes that

work together to create meaning. I will explore how the integration of multimodal resources in digital communication opens up new possibilities for teachers to express themselves and to create meaning. In doing so, I will argue that teachers' emerging digital repertoires have the potential to conflict with their existing perceptions of literacy and pedagogy and produce affective responses as a consequence.

As they become more knowledgeable and skilled in using digital technologies, teachers' understanding of literacy expands beyond traditional forms of reading and writing to include digital literacies. These digital literacies not only encompass the ability (*the doing*) to effectively navigate, evaluate, create and communicate using digital tools and platforms, but extend to critical digital literacy (understood as the ability to engage critically with digital media.)

1.1 Background to the study

My interest in this particular investigation was triggered by the Department of Basic Education 's (DBE) announcement that it would be introducing *Coding and Robotics* as a subject into schools by 2025. When the document speaks about embracing the "digital and information-driven world" (CAPS Draft, *Coding and Robotics*, 2022:12), it is signalling a clear belief that literacy practices and related pedagogies in South Africa should (and must) shift towards the digital in order to keep up with the perceived demands of the Fourth Industrial Revolution (4IR).

These messages carry with them powerful neoliberal ideas in which digital technologies are portrayed as autonomous and desirable resources vital for economic growth and individual freedom. However, sociolinguists point out that when technology is presented as autonomous or reified, it is dislocated from its social, political and economic context allowing for a dominant discourse to prevail where concerns around diversity, divergence and equity of access are minimised.

Mills (2016) argues that digital technologies are not 'neutral', but are profoundly ideological in nature. Because they carry the presumptions of their designers about how the world works, biases are an inherent feature. Built-in affordances and constraints privilege some people while others will be disadvantaged. This pattern is particularly pronounced in our fragmented South African landscape where the uptake of digital technologies has been uniquely skewed along the lines of social class, race, ethnicity, income, age and gender and continues to serve as an amplifier of social and political inequality. As such, the narrative in which Black South African

teachers and learners, particularly in rural contexts, remain marginalised with limited access to resources, has not fundamentally changed since the country's transition to democracy.

For the DBE's mandate to be fully realised, it seems inevitable that the full weight of responsibility for this pedagogic project will be transferred to teachers. Irrespective of the context in which they work, they would then be expected to prepare young people for 'future success' by ensuring that they leave the school system with strong digital literacy skills. In this discourse, the 'upskilling' of teachers becomes somewhat of a panacea and allows the DBE to feel comfortable that it is delivering on its mandate when it says that it has already provided Information and Communication Technology (ICT) training for 44 000 teachers in collaboration with the University of South Africa (UNISA) (National Assembly Internal Question Paper, 2023: 1). However, as desirable as the upskilling of teachers in digital technology sounds, it often fails to take into account the profound social and material limitations that exist in the context of our fragile South African schooling system. Insufficient funding, limited access to technology and inadequate professional development opportunities hinder effective integration. Rapid technological change, digital literacy gaps and technical difficulties further complicate the process. Pedagogical challenges such as resistance to change, time constraints and curriculum limitations also pose significant obstacles. In addition, the digital divide and unequal access to technology and training exacerbate these issues. All of these constraints are amplified by the occurrence of *load-shedding*, particularly so during the early part of 2024 when South Africa, including Cape Town, experienced the disruptive effects of regular electricity supply cuts.

Digital intervention programmes often reflect the types of divisive discourses that currently circulate around digital technologies in education. When policy makers and curriculum planners default to 'one-size-fits-all' ICT intervention programmes, they are 'sold' as a logical conclusion to fixing the challenges posed by the presence of technology in our education system. This approach is informed by the kind of deterministic thinking that reduces digital literacy to a set of measurable individual skills and abilities. The notion of 'upskilling' inadvertently suggests that teachers are somehow at odds with an increasingly digital world that demands relevance and adaptability. Ironically, when heightened performance anxieties arise, it stymies teachers from embracing the very digital literacy practices deemed desirable in the first place. Deterministic thinking by those in power, therefore minimises the importance of socio-material realities, entrenches a harmful digital divide between those who 'can' and those who 'can't' and contributes to the ongoing negative messages circulating around teacher 'competencies' in general. It seems equally inevitable then that where such curriculum initiatives contradict

teachers' perceptions and lived experiences of technology, they will be met with antipathy. This is especially true if it is also perceived as an encroachment on their autonomy and professionalism.

Against this backdrop, my study aims to show how digital literacy is not solely determined by individual skills or abilities, but is deeply entangled within the social and material factors that shape it. This approach is in line with Prinsloo's (2015) research into the situated use of technology in which he argues that greater attention should be given to the diverse ways in which adults and children in classroom settings use digital resources in making meaning, viewed as a process which is "profoundly informed by concrete, material, located, historically shaped dynamics." (Prinsloo, 2015:13)

1.2 The context and rationale

I conducted my case study informed by ethnographic research methods over a three week period at a Quintile 3 primary school situated in a working class community on the Cape Flats. I became interested in the school as a potential research site because of its reputation within the local teaching community. It is perceived as a welcoming, resourceful and 'progressive' institution, despite facing significant social issues and disparities in access to resources, including technology and digital literacy opportunities. It was there that I first met the two participants, Jay Adams (29) and Vee Petersen (33) (both pseudonyms) who had volunteered to participate in my research. Their interest was drawn by the *digital* aspects of the research proposal because their assigned roles as the school's 'tech champions' meant that they were always looking for new ideas and perspectives on how to go about integrating digital technology into the classroom. By their own admission, their role as 'tech champions' is a difficult one to fulfil given that the school's capacity to provide a fully integrated 'digital experience' to its learners is limited. I learnt that they had been Grade 4 teachers at the school for more than 5 years and in this time, they had developed a healthy, supportive working relationship because of their common interest in digital technology. In shadowing, observing, interviewing and interacting with Jay and Vee over the three week period, I was able to collect a wealth of data that captured the different strategies, methods and tools which they leveraged while 'taking hold' of technology in the classroom. More importantly, the data also captured their expressed beliefs, ideas and feelings about their enmeshment with digital technology.

In retrospect, this resource-constrained school as a site for research presented a very different socio-material and cultural context from the middle class one with which I was familiar from my own work experience. This prompted me to confront the biases that stemmed from my own resource-rich teaching experiences. Guided by a social justice perspective that seeks to understand and address the systemic inequalities that exist in our education system, my research into the digital repertoires of these teachers gained an important rationale.

It allowed me to see Jay and Vee's active involvement with the ICT project at their school, as an expression of their conscious commitment towards becoming digitally creative, innovative, relevant and adaptable. They did not appear to be discouraged by the significant socio-material limitations that exist in the domain.

The concept of the digital repertoire therefore allows for a multidimensional approach in which skills and proficiencies with digital tools and platforms are viewed as contingent to such important variables as: attitudes towards and prior experiences with digital technology, cultural norms and values, educational opportunities and access to technology. (Chetty et al, 2017:9). In this way, the digital repertoire as a unit of analysis in this research becomes an important, nuanced and varied meaning-making resource in the classroom space, giving teachers agency and restoring their need to feel effective, relevant, and adaptable in an increasingly digital world.

1.3 Research questions

I approach the research with the following questions:

1. What are the key components of teachers' emerging digital repertoires in the context of a resource constrained school domain?

2. What are the perceived constraints and affordances experienced by teachers when they draw on their digital repertoires to engage learners?

3. What impact does the integration of digital technology have on teachers' pedagogic approaches and the dynamics of the classroom space?

1.4 Chapter outline

Chapter 2: Theoretical framework and literature review

In this chapter I review the literature and examine the major theories and concepts which shape and contextualise the research. The digital repertoire will be outlined as a key concept here.

Chapter 3: Research design and research methodology

In this chapter I explain the research design and methodology used to undertake the research. The design is a qualitative case study informed by ethnographic research approaches to data collection and analysis.

Chapter 4: Introduction to the digital repertoire

In this chapter, I will explore how teachers' existing communicative and interactive skills are adapted and transformed within digital environments, emphasising that digital repertoires are not separate from the physical world but intertwined with it. A key focus is on how teachers navigate, leverage and make sense of available digital resources for communication and learning, particularly within the constraints of a resource-constrained school domain.

Chapter 5: Exploring the digital repertoire in its broader context

This chapter broadens the scope of analysis beyond individual teachers to examine how institutional factors influence technology integration and the development of teachers' digital repertoires. It investigates the impact of school-level policies, resource allocation, infrastructure, leadership, professional development opportunities and broader societal/cultural factors on teachers' technology use. It delves into the complex interplay between individual agency and these contextual layers, revealing how they can either support or hinder the effective integration of digital technology in teaching.

Chapter 6: Conclusion

In this final chapter, I will draw conclusions from my study and offer guideline recommendations from a socio-material perspective on how future digital intervention programmes should approach the issue of teacher training.

Chapter 2:Theoretical framework and literature review

2.1 Introduction

My theoretical lens is shaped in part by the principles of the New Literacy Studies (NLS), (Heath 1983, Street 1984, Gee 1996, Barton 1994). This approach is rooted in a socio-cultural perspective of literacy, i.e. literacy as a set of reading and writing practices embedded in complex social and cultural contexts.

Influenced by the seminal work of Street (1995) and his 'ideological' model of literacy practices, NLS research focussed on how people take hold of reading and writing across various domains in society. As Street points out, the term 'taking hold' emerged in the ethnographic research of Kulick and Stroud (1993). It was used as an agentive reference that provided a way of talking about how people make use of literacy in context: "There are now many such examples from around the world which indicate how the communicative repertoire varies, from people simply taking literacy and doing with it what they had already done…" (Street, 1999: 13).

One of the key conceptual frameworks informing the study of New Literacy Studies is the notion that literacy is not merely a set of technical skills to be mastered in isolation, but a set of practices,influenced by ideology and power relations within society. An NLS perspective on literacy actively challenges an autonomous model of literacy that "fulfils the political purposes of those in power to maintain a position of superiority by marginalising other forms of literate knowledge, specifically the rich and varied practices that students bring to the classroom" (Larson and Marsh, 2015: 17). By entrenching a rigorous culture of ethnographic research, especially in the field of education, NLS studies have allowed us to gain significant insights into the richness and complexity of the literacy practices of teachers and students as they draw on diverse literacies gleaned across interconnected domains of life.

The field of NLS has experienced a number of significant generational shifts in thinking, which have contributed to a more comprehensive understanding of literacy practices and their significance in diverse contexts. Initially, the focus was on understanding literacy as a social practice embedded in cultural and ideological contexts. The two interconnected concepts that emerged as basic principles of the NLS approach, were termed *literacy events* and *literacy practices*. These concepts offered ethnographic researchers a frame of reference for both sustained observation, description and analysis. The notion of the literacy event, i.e "any occasion in which people use written language to make meaning, communicate or accomplish

something" (Heath, 1982: 50), was central to the works of noted linguistic ethnographers like Hymes (1972), Heath (1982) and Street (2003), who, according to Burnett and Merchant (2018), influenced other researchers to "articulate a sociocultural position capable of elaborating on the all-important social interactions that happen around and through text." (Burnett and Merchant, 2019: 47)

However, Burnett and Merchant go on to argue that the fixed notion of a literacy event becomes problematic when measured against the complexities presented by digital technologies. They point out that literacy events are no longer bounded by space and time and that texts have the ability to 'travel' forcing literacies to become 'transcontextual' in nature. As people take hold of the affordances of digital electronic media for different purposes in both online and offline environments, it disrupts the notion of predictable situatedness to the extent where literacy events can be restated as "porous and permeable" and effectively described as lively, fluid and emergent (Burnett and Merchant, 2019: 47).

The proliferation of digital technologies set against the backdrop of intensified global mobility, has resulted in a shift towards an understanding of literacy not just as plural, but as multimodal and multidimensional. Within this changing communication landscape, becoming 'literate' meant making sense of the world and one's place in the world across different domains mediated by a plethora of new communication resources (Kress, 2010:5).

For the purposes of this research, I view the importance of the NLS approach in the field of education as contained in the notion that schools must recognise and attend to the diverse ways in which learners make meaning and engage in literacy practices. This includes acknowledging the multilingual, multimodal, and digital aspects of learners' literacy practices as interconnected and influenced by various contexts and media. Teachers need to move away from viewing digital technologies, multilingualism, and multimodality as separate entities but rather as interconnected elements that shape learners' literacy experiences (Jewitt, 2008; 32; 241). When they do this, teachers signal their intention to engage with their understanding of the *affordances* (logic) of the new literacies associated with Web 2.0 technologies. More significantly is the underlying intention to turn the classroom space into a more democratic one by entrenching the kind of behaviours and practices typically associated with these lively, fluid and emergent technologies (Burnett and Merchant, 2019: 47).

2.2 Multimodality and Multiliteracies

This study draws on *multimodality* as an important framework that allows researchers to capture the complexity of the new range of literacy practices that unfold against the backdrop of the digital turn. Developed by theorists such as Kress (2001), van Leeuwen (2002) and Jewitt (2011), multimodality recognises that communication and meaning-making involve more than just language and allows us to move beyond a text-based analysis. It takes into account various modes of communication, such as visuals, sounds, gestures, objects, and spatial arrangements. Following Kress' emphasis on the interconnectedness and integration of these different modes in making meaning, multimodality was defined as: "*. . . the use of several semiotic modes in the design of a semiotic product or event*" (Kress et al., 2001:20). As Mills (2015) points out, with the persistence of conservative pedagogies and the ideological dominance of written words in current literacy curriculum and assessments,

> there is a need for multimodal research in educational settings to investigate the multimodal resources, actions, texts and social practices that are associated with the digital communication environments that are required for meaningful participation in a changing society (Mills, 2015:90).

This research conceptualises the classroom as a multimodal space, a space in which teachers have the potential to draw on a range of available resources across various semiotic modes, to engage learners. These might include a variety of multimodal texts, such as lesson plans, slideshow presentations, educational videos, and social media posts. By analysing these texts through a multimodal lens, we can identify the specific modes that teachers use to convey information, persuade, and inspire. We can also examine how these modes interact with each other to create meaning, and how they are influenced by the social and cultural contexts in which they are produced and consumed. In doing so, multimodality offers a framework that adds depth to our understanding of the digital repertoire as an expression of the way in which teachers communicate, engage with content, and facilitate learning in the classroom when accessing diverse channels and media.

The notion of communication being multimodal broadened the scope of literacy pedagogy allowing theorists of the New London Group in particular to argue that literacy is not just about reading and writing with words, but also about decoding and understanding signs, symbols, pictures, and sounds in various social contexts: "Literacy teaching is not about skills and competence; it is aimed at creating a kind of person, an active designer of meaning, with a sensibility open to differences, change and innovation." (Cope and Kalantzis, 2006:10). This

research draws on the NLG argument for a socially responsive, transformative curriculum that takes into account the diverse experiences, interests, and literacy practices of learners. The inclusion of multiple literacies and multimodal forms of communication in educational settings is an acknowledgement of the increasing significance of cultural and linguistic diversity in a globalised world dominated by capitalism:

> A pedagogy of multiliteracies also opens access to powerful learning to a broader spread of learners… allowing for divergent learning orientations and different modalities in meaning making in a world where diversity is becoming all the more critical. (Cope and Kalantzis, 2006:20).

2.3 Socio-materialism

My theoretical lens is also shaped by a socio-material approach which shifts focus away from the social and ideological dimensions of literacy practices ('situatedness'), towards the agency and materiality of non-human actors (such as technologies and artefacts) in shaping actions, experiences, and learning processes (Toohey & Dagenais, 2015). Socio-materialism provides a framework for understanding the intersection between social and material factors in shaping individuals' experiences with digital technology in the classroom. It states that material and non-human actors (artefacts) play an important role in shaping knowledge and practices. Such an approach also diverges from a traditional constructivist paradigm where the emphasis is on human cognition and individual agency rather than on material context (Toohey & Dagenais, 2015 :303)

As Gourlay (2015) argues, while our understanding of literacy as a situated social practice has grown, this framework often "overlooks the role of material objects like paper, keyboards, and mobile devices" (Gourlay, 2015: 485). Drawing from the field of Actor-Network Theory (ANT), socio-materialism posits that communication is not solely a human activity, but is deeply intertwined with the material and technological aspects of the digital environment. Communication practices that involve digital media emerge as a complex interplay between human and non-human elements, with each affecting the other. In this paradigm, physical objects such as digital devices gain agency and as such, have an impact on human actions and interactions in profound and unpredictable ways. In addition, new media has given rise to alternative ways of producing, circulating, and consuming texts, which have had implications for how texts relate to one another and their stability over time. A socio-material approach views texts as "relational, mutable, and ephemeral, constantly shifting in meaning and interaction with societal and material factors" (Burnett and Merchant, 2020: 360).

Based on Latour's concept of *objects as mediators* and Hayles' notions of *materiality*, Gourlay (2015), is able to show how learners in educational settings maintain an ongoing dialogue with objects (technologies, texts) influencing not just their literacy practices but their interpretation and interaction with these entities. In this 'dialogue,' nonhuman 'actors' are personified, thereby altering the learners' interaction with their devices (Gourlay, 2015: 498).The key distinction of materiality theories is their move away from solely attributing agency to people, recognising the mutual constitution of users and tools through interaction, rejecting dualistic understandings of animate/inanimate participants.

2.3.1 Socio-materialism: Assemblage

The socio-material paradigm, which emphasises the critical interconnectedness of social and material entities, utilises the concept of *assemblage* as a key theoretical framework. Often linked to the work of Gilles Deleuze and Félix Guattari (1980), assemblage theory has had a significant impact on socio-materialist approaches. The notion of assemblage involves the conceptualisation of a network of relations as a constellation of various dissimilar components - human and non-human - which interact and collaborate within a specific context, with elements encompassing individuals, technologies, artefacts, discourses, practices, and institutions. Deleuze and Guattari (1980) describe this 'coming together' of heterogeneous elements as uniquely entangled, fluid, contingent, affective and unpredictable. In the process, *becoming* is viewed as a continuous process of change that resists static or fixed identities. These assemblages experience constant evolution as elements can enter, leave or change, contributing to the notion of 'becoming'. In the process of conceptualising the spatial repertoire, Canagarajah (2017) points out that the notion of assemblage allows sociolinguistic research to view communication as shaped by diverse semiotic resources working together: "all modalities, including language, work together and shape each other in communication" (Canagarajah, 2017: 44). Drawing on Kell's (2010) term *entextualization*, Canagarajah argues that texts are constituted and evolve over time in what he refers to as a "tapestry of voices" - i.e. as the coming together of social, spatial, and material resources (Canagarajah, 2017: 44).

In educational settings, assemblage theory provides a dynamic framework that allows researchers to map the complexities of the entanglement of humans and material and its impact on classrooms' ecologies and language and literacy learning. In their article on *Videomaking as sociomaterial assemblage*, Toohey & Dagenais (2015) argue that the "intricate liaison of teachers, children, textbooks, classroom space, digital technologies, discourses and mandated

tests" constitute this socio-material assemblage, which in turn impacts learners' literacy competency definitions and performances (Toohey & Dagenais, 2015 :312). The authors show how a diverse group of primary school children, including multilingual learners, engaged in video production using iPads. Using ethnographic methods, the researchers were able to examine the complex interactions between learners, digital tools and classroom practices. Their analysis, informed by New Literacy Studies, theories of materiality, and the concept of socio-material assemblage, revealed how videomaking provided opportunities for learners to develop new literacies and demonstrate competence in multimodal communication.

A key finding here was that video production allowed learners, particularly those who struggled with traditional literacy tasks, to position themselves as knowledgeable and creative contributors within a collaborative learning environment. Toohey & Dagenais' (2015) study highlights the importance of considering the dynamic interplay of human agency, digital tools and social context in shaping learning experiences and literacy development.

Similarly, Burnett and Merchant (2020) use assemblage theory to explain how meaning-making unfolds within digital environments, going beyond traditional notions of text and literacy while emphasising the interconnectedness of human and non-human elements. They argue that meaning-making with digital texts is not solely a cognitive process but emerges from the interactions within a dynamic assemblage. This assemblage includes not only the individual and the text but also the digital tools, platforms, social contexts, and affective responses involved. The authors highlight how digital technologies, as part of the assemblage, shape how texts are created, shared, and interpreted, leading to new forms of literacy practices.

Because they are interested "in what texts *do* and in what *happens* to texts as they circulate," Burnett and Merchant (2020: 362) use the example of a school's digital noticeboard to illustrate how the meaning and function of a text depend on the socio-material assemblage of which it is a part. They describe how the noticeboard, intended for communication, might be overlooked by some, becoming mere 'wallpaper,' while for others, it serves its intended purpose. This difference arises not from the text itself but from how it is positioned within the specific social and material context of the school. Factors like the physical placement of the board, the existing communication practices within the school, and the individual's role and relationship to the information presented all contribute to whether the noticeboard functions as a meaningful text or not. This example demonstrates how meaning is not inherent in the text but emerges from its interactions within a particular assemblage. Their approach emphasises the fluidity, contingency,

and distributed nature of meaning in digital environments, challenging traditional views of literacy as solely an individual cognitive process.

The extension of assemblages beyond physical spaces to virtual and conceptual territories indicates their comprehensive and inclusive nature, thereby expanding socio-material analysis parameters. Socio-materialist researchers, in using assemblage theory, engage in an analytical inquiry, challenging established assemblages and their power dynamics, examining how certain assemblages reinforce or invert existing social structures and ideologies. For example, Fullagar et al (2018) use assemblage theory in their study into how digital technologies, including social media, mobile devices and the internet more broadly, contribute to both the reproduction and transformation of gender relations. They explore how gender is performed and negotiated online and how these performances are influenced by the materiality of digital platforms. They demonstrate how algorithms can perpetuate biases, how data practices can exclude certain groups and online platforms can be sites of harassment and discrimination. However, Fullagar et al (2018) also highlight the potential of digital technologies to empower marginalised groups, facilitate feminist activism and create new forms of community and connection.

2.3.2 Socio-materialism: Affect

The notion of *affect* plays a significant role in understanding how human and non-human entities interact, shape literacy practices, and influence knowledge production. In this context, affect refers to the emotional and embodied responses and experiences that emerge in socio-material interactions, particularly in and around the presence of technology. This perspective acknowledges that non-human entities also have affective qualities capable of inducing emotional or physical responses in users. Affect is not solely experienced or generated by humans, but is also produced through the relational and dynamic interactions between human actors, non-human elements (including technologies and artefacts), and textual components. Drawing on Spinoza's (1910) ideas on 'modifications of the body', Burnett and Merchant (2020) note that: "As bodies come into relation with other bodies, they affect and are affected by them; they become different and subsequently help generate other ways of doing and being." (Burnett and Merchant, 2020:361).

Gourlay's (2015) research into learner engagement with technologies, revealed that objects as 'non-human actors' are agentive. She notes how this emerges in the way learners relate to their technological devices, often describing them in personal or emotional terms. Participants gave

examples of close ties or even forming deep connections with, and being attached to their devices (Gourlay, 2015:496). In the entanglement of material, social, and textual factors in shaping and influencing affect in digital technology, such technologies appear to not only act on behalf of or in place of humans but also can exceed human intentions and awareness. This is evident in the way digital technologies, such as social media platforms, continuously modify user actions based on underlying algorithms, creating feedback loops that shape affect and behaviour.

Burnett and Merchant (2020) speak about the permeability of affect in digital environments, particularly about text and literacy. They argue that affect is not solely experienced or generated by humans but is also produced through the textual and social-material arrangements within which humans and non-human actors interact. In this socio-material perspective, the concept of affect challenges traditional understandings of text and its role in shaping meaning. Texts are not static entities with fixed meanings, but rather dynamic and relational participants in socio-material assemblages. As texts are produced in these socio-material arrangements, they both affect and are affected by the social, material, and textual elements surrounding them. In other words, texts are not solely created and interpreted by human actors but are also influenced by the algorithms and infrastructures that shape their production and reception. Texts are ephemeral and mutable, constantly shifting in meaning and significance. This understanding of affect in digital technology challenges traditional notions of authorship, textuality, and reader roles (Burnett & Merchant, 2020).

Affect is intrinsically tied to the possibilities for action (affordances) and limitations (constraints) of technologies and material artefacts. A user's affective reactions can be influenced by their perception of what a technology facilitates or obstructs them from doing. The disparity between user expectations and a technology's affordances can engender affective reactions. In his chapter on ‘Spatialities of feelings’ Thrift (2008) uses the term ‘moodscapes’ to refer to the dynamic and ever-changing landscapes of emotions, affect and moods that emerge from the interaction between individuals and their material surroundings (Thrift, 2008: 171). An example of this idea can be found in material environments such as a classroom equipped with interactive digital displays which may contain a notably different affective atmosphere than a conventional classroom with chalkboards.

Affect offers my research a dynamic material framework to articulate the 'ways of doing and being' that unfold in a classroom as various semiotic resources (both human and non-human) assemble to form observable, intricate social and material networks.

2.4 Technologies are ideological: mobility, affordances and constraints

Communication technologies have shifted our perception of time and space as well as the way in which we engage with text (literacy practices). The mobility thus enabled, has transformed various aspects of our lives, including family dynamics, economy, security, work, citizenship, consumer behaviour, and pleasure. They seem, for the most part, to have become embedded in the very fabric of modern life to the extent where they have almost 'vanished' and appear normalised and naturalised. They have, in effect, become domesticated.

As translocal resources that operate in local contexts (such as schools), technologies are not autonomous. Mills (2016) argues that digital technologies are not neutral, but are profoundly ideological in nature. The creation, design, and deployment of technological tools are strongly influenced by the values, perspectives, and goals of the individuals and cultures that manufacture and apply them. As such, these technologies may reflect certain philosophies and power hierarchies. Technology's inherent ideological nature manifests in numerous manners. In the form of embedded values, for instance, technologies, far from being impartial, often mirror the assumptions and values of their creators (Jones and Hafner, 2021). Examples of this could include social media platforms that prioritise features for user interaction and advertising revenue, thereby potentially favouring certain ideological viewpoints. Additionally, the ubiquitous use of smartphones and social media has altered social communication, further reinforcing novel social norms and practices. As Hafner and Jones (2021) argue, "some technologies are intentionally designed to create certain kinds of habits in their users and to promote certain kinds of social practices." (Jones and Hafner, 2021:140). They refer to the process by which social practices and conventions 'solidify' around various technologies as the 'technologization of practice'. In this scenario they argue, the dominant technologies we use control the way in which we do certain things. The notion of affect speaks to this idea.

Power dynamics in society can also be influenced by technologies, where disproportionate access to and control over certain technologies can shape the distribution of power and resources. 'Digital divides' can therefore emerge, with particular groups or regions having limited digital resource access, potentially intensifying existing societal inequalities. A critical

examination of the ideologies inherent in technologies, and mindful consideration of their societal implications are all crucial. Such considerations can encourage more ethical technology use and development, promote inclusivity, and empower users to support technologies that align with their values (Hafner and Jones, 2021).

Potzsch (2021) argues that being digitally literate should involve an understanding of the material dimension of digital technologies. This includes their technological affordances, economic implications, societal, environmental, and physiological impacts even as they are taken hold of in very variable ways within everyday practices. She defines critical digital literacies as the "knowledge, skills and competences needed to understand the vast range of implications of digital technologies." (Potzsch, 2021:4).

2.5 The digital repertoire defined

My research aligns in part with Darvin's (2018a) definition of the digital repertoire as "the individual's set of linguistic, semiotic, material, technical and social resources that enable the performance of various digital practices in diverse contexts." (cited in Liu and Darvin, 2024: 338). In using the concept to explain digital inequality, the authors argue that the repertoire is inextricably linked to "the individual, whose history, social location and identity shape his or her access to resources" (Liu and Darvin, 2024: 338). While this definition emphasises the individual's resources, Liu and Darvin (2024) also acknowledge the influence of broader structural factors. They discuss how institutional power and ideology shape access to and investment in digital resources. Specifically, they mention how these structural forces create dominant ways of thinking that determine modes of inclusion and exclusion in both online and offline spaces (Liu & Darvin, 2023: 338).

Their findings suggest that the availability of infrastructure and the prevailing social and institutional norms play a significant role in shaping teachers' digital repertoires. Access to technology, the quality of internet connectivity and the support provided by institutions all contribute to the development of these repertoires. Therefore, while individual factors are important, Liu and Darvin's (2023) study points to the importance of understanding the broader socio-material context within which teachers operate in order to gain insight into the tensions that exist within their digital repertoires.

2.6 The digital repertoire as an extension of the spatial repertoire

Darvin's (2018a) definition of the digital repertoire focuses largely on the agency of the individual and the diverse resources they utilise in their digital practices. However, it underplays the crucial role of spatial contexts in shaping these repertoires. Canagrajah's (2017) concept of the *spatial repertoire* helps address this gap by showing how individuals assemble and deploy diverse communicative resources in what he refers to as "situated interactions" (Canagarajah, 2017: 36). My study therefore brings together Davin's definition of the digital repertoire with Canagarajah's concept of the spatial repertoire to enable a richer framework for subsequent data analysis.

According to Canagarajah, spatial repertoires encompass not only linguistic resources but also social, cultural and material resources that individuals draw upon as they navigate different communicative contexts. He uses the metaphor of "shuttling" (Canagarajah, 2017: 36) to describe how individuals move between these different spatial scales – local, translocal, and global – and how their language practices are shaped by the affordances and constraints of each space.

As Canagarajah observes during his interactions with STEM scholars, spatial repertoires are not limited to what an individual already knows. They are assembled *in situ*, often collaboratively, and can include resources beyond an individual's existing linguistic proficiency. This means communication relies on the available resources, both material and semiotic, within the specific environment and through interactions with others present (Canagarajah, 2017: 37). While Canagarajah views language as a key component, he points out that spatial repertoires encompass *all semiotic resources* available in a given space. This includes not just verbal language but also gestures, visual aids, objects, and the physical environment itself. Canagarajah emphasises that spatial repertoires are not abstract or individualistic. They are deeply embedded within the material ecology (the physical space and its affordances) and facilitated by social networks (the relationships and interactions within that space). The arrangement of furniture in a room, the available technology, and the relationships between the people present all contribute to the spatial repertoire.

Canagarajah's notion of the spatial repertoire offers an additional level for understanding the interplay between physical and digital spaces and mapping how individuals and communities navigate and negotiate the fluid boundaries between the material and the immaterial, the local

and the global, the embodied and the digital. By applying the concept of spatial repertoires to the classroom (as a material ecosystem), it becomes more than just a physical space when digital resources, devices and online tools are present. In this digital space, repertoires become shaped not only by technical skills (what an individual already knows), but also by the ability of teachers and learners to navigate and leverage the available digital resources for specific communicative purposes - and *assembled in situ*. The spatial repertoire allows us to see that the digital and physical aspects of the classroom are interconnected and that digital repertoires represent the complex interplay of physical, digital, and social factors that shape teaching and learning experiences in that space.

The spatial repertoire constructs digital technology as a semiotic resource that mediates and transforms language use and communication. In this context, the digital repertoire can be thought of as an extension of the spatial repertoire into the digital realm, adapting the principles of situated, multimodal and agentive communication to the unique affordances and constraints of digital spaces.

2.7 The digital repertoire in schools: placed resources and the situated nature of digital literacies

The digital repertoire is presented in my research as a lens through which to view the diverse ways in which teachers attach meaning to digital technology and make sense of how they use it both in and out of the classroom. As a set of meaningful or situated practices, the repertoire is understood to be emergent, embracing various semiotic resources and a reflection of the agency of individuals as they navigate and draw on the resources available in digital spaces.

While studies into the integration of Information and Communication Technology (ICT) in schools in South Africa have tended to focus largely on the development of skills and proficiencies amongst learners, little research has been done to gather qualitative data that captures teachers' subjective experiences of their intertwinement with technology in the school domain. That said, Prinsloo and Sasman's (2015) research into teachers' use of digital media in the form of Interactive Whiteboards (IWB) in early schooling in South Africa, offers valuable insights into how teachers' literacy practices and pedagogical approaches are impacted by their engagement with digital technology. While IWBs were seen to contain affordances for multimodal and interactive learning that could transform literacy practices, the authors observed that the teachers in their case study used the digital media instead to reinforce traditional teaching methods and language hierarchies. Teachers' focus remained on basic literacy skills,

reflecting the constraints of the curriculum and standardized testing, which prioritise print-based literacy. Prinsloo and Sasman (2015) also noted that despite the multilingualism of the community, the teachers' emphasis on English in the classroom marginalized learners' diverse linguistic resources.

Prinsloo and Sasman (2015) argue that a teacher's digital repertoire is a complex interplay of technical skills, pedagogical knowledge, and an understanding of the socio-cultural context, all of which shape how they integrate digital technologies into their teaching. In the context of their research, IWBs are viewed as *placed resources* where the meaning and function of digital tools are not fixed but are negotiated and shaped by the local context. This notion of *placed resources* was further developed by Prinsloo's (2019) research into children's engagement with digital media in diverse social and cultural settings. He argued that digital literacies are not simply about acquiring technical skills but are embedded within broader social and cultural practices. His research challenges the assumption that certain digital literacy practices are universal or neutral, highlighting how factors like class, race, gender, language, and location influence access and engagement with digital technologies. It also highlights how teachers and children in under-resourced communities might develop unique strategies for accessing and utilising limited digital resources, demonstrating resourcefulness and creativity that might not be captured by traditional assessments of digital literacy (Prinsloo, 2019: 15).

Prinsloo (2019) points out that teachers' familiarity with formal, classroom-based digital literacy practices might not align with the informal, often more creative and exploratory ways children use digital media in their homes and communities. Prinsloo argues that this mismatch can lead to a devaluation of children's out-of-school digital experiences and a failure to recognise the valuable skills and knowledge they develop in these informal settings. He goes on to emphasise the need for teachers to broaden their understanding of digital literacies beyond traditional classroom applications and to recognise the diverse and situated nature of children's digital engagements. This includes acknowledging the "influence of popular culture, social media, and gaming on children's digital literacy practices" (Prinsloo, 2019: 3). By understanding these diverse practices, Prinsloo believes that teachers can better connect with learners' existing knowledge and create more relevant and engaging learning experiences.

Jenkin's (2021) small case study supports Prinsloo's findings that an effective mismatch between teachers' formal, classroom-based digital literacy practices and learners' out-of-school digital experiences complicates how digital technologies are taken hold of and integrated into a

school setting. Her research was conducted at a desegregated, historically white school in Cape Town and focussed on the digital literacy practices of four high school learners across their home and school contexts, examining the challenges and contradictions they encounter. It revealed that learners develop sophisticated digital literacies through informal learning experiences with technology outside of school, often exceeding the digital skills and knowledge expected within the classroom. Jenkin argues that this discrepancy spotlights the need for teachers to expand their own digital repertoires to effectively engage with learners' diverse and evolving digital competencies In doing so, the author believes that teachers can create more engaging and relevant learning experiences that bridge the gap between learners' in-school and out-of-school digital lives (Jenkin, 2021: 104).

Jenkin's study suggests that teachers need to move beyond traditional, print-centric pedagogical approaches and embrace digital tools and platforms that align with learners' out-of-school digital literacy practices. This includes recognising and valuing the informal learning that takes place outside of school and integrating these experiences into classroom activities. Jenkin's research highlights the importance of teachers developing an awareness of how the diverse racial and socioeconomic makeup of a school can play a significant role in influencing the way in which digital literacy practices unfold. As she points out, issues of access and equity lie at the center of teachers' critical understanding of digital technologies and their social and cultural implications. For her, the digital repertoire of teachers should therefore involve not only acquiring technical skills but also developing pedagogical strategies that promote responsible and ethical digital citizenship (Jenkin, 2021: 72).

Tour's work (2015) directly explores the intersection of teachers' personal and professional technology use, offering useful insights into the development of their digital repertoires. The study investigates how teachers use digital technologies in their everyday lives and how these practices shape their integration of technology in the classroom. Using a technique called 'participant-generated photography', the researcher asked three teachers (teaching at year levels 2, 3 and 12 respectively) to take 10-15 digital pictures that represented how they used technology in their daily lives and in their teaching. This method allowed the teachers to visually document their own technology practices, offering a personal perspective on their interactions with technology. A detailed analysis of these photos revealed *where* the teachers used technology, both in their personal lives and in their teaching; *how often* and *what kinds* of technologies the teachers used; *why* the teachers used technology in particular ways; and how technology use was embedded within their social and cultural contexts. Tour's findings reveal a

complex relationship between personal and professional technology use, suggesting that teachers' *digital mindsets*, shaped by their personal experiences, significantly influence their pedagogical approaches with technology (Tour, 2015: 136).

Tour's research highlights that teachers who actively engage with technology in their personal lives tend to demonstrate a greater comfort and willingness to experiment with technology in their teaching. These teachers often possess a broader range of digital skills and knowledge, which translates into more diverse and innovative pedagogical practices with technology. Conversely, the study found that teachers with limited personal technology use often exhibit a more cautious and traditional approach to technology integration in the classroom (Tour, 2015: 129).

This connection between personal and professional technology use directly relates to the concept of the digital repertoire. In Tour's view, a teacher's digital repertoire encompasses not only their technical skills but also their beliefs, attitudes, and experiences with technology. Her study demonstrates how personal technology use shapes these aspects of the digital repertoire, influencing teachers' comfort levels, pedagogical approaches, and overall effectiveness in integrating technology into their teaching. The research suggests that fostering teachers' personal engagement with technology can be a crucial step in expanding their digital repertoires and promoting more innovative and effective technology integration in education. By encouraging teachers to explore and experiment with technology outside of the classroom, Tour believes that more confident and adaptable digital teachers who are better equipped to meet the evolving demands of the digital age, can be grown (Tour, 2015: 48).

While Sefton-Green et al.'s (2016) article focuses on young children, it has significant implications for the digital repertoire of teachers. The authors speak about the evolving nature of literacy in the digital age, highlighting the need for teachers to move beyond traditional notions of reading and writing. This directly links to the concept of a teacher's digital repertoire, which encompasses the diverse skills, knowledge, and experiences required for effective technology integration. The authors stress the importance of multimodal literacy, requiring teachers to expand their repertoire to include multimedia tools and platforms. They argue that the need for children to develop critical thinking skills in the digital landscape implies that teachers must also possess and model these skills, incorporating strategies for evaluating online information and including responsible digital citizenship into their repertoire (Sefton-Green et al, 2016: 26).

Sefton-Green et al (2016) also highlight the influence of social and cultural contexts on digital literacy practices, urging teachers to develop a repertoire that reflects an understanding of how technology intersects with issues of equity, access, and diversity. Sefton-Green et al's call for research on effective pedagogical approaches suggests that teachers must continually update their digital repertoire with new research findings and innovative teaching strategies. They believe that there is a need for teachers to develop a dynamic and adaptable digital repertoire that reflects the evolving nature of literacy, encompassing not only technical skills but also a critical understanding of technology's impact on learning, communication, and social interaction. In drawing on Colvert's 3D model of digital literacy (2015), the authors state that: "It is important, therefore, to consider the ways in which digital literacy needs always to be understood to include its operational, cultural and critical dimensions" (Sefton-Green, et al, 2016: 26).

Selwyn et al's (2016) research into teachers' work with digital technology provides a valuable perspective on how digital repertoires are developed, deployed, and constrained in practice. It moves beyond abstract notions of digital literacy to examine the messy realities of integrating technology into the complex world of teaching. Their qualitative study examines the various ways teachers use and are used by digital technologies in their daily work. Their approach is shaped by their view that the act of teaching within a capitalist system of production can be thought of as *labour*, albeit scripted as "diverse forms of 'immaterial' forms of labour".They argue that this approach is merited because it "foregrounds critical tensions and struggles that otherwise tend to be overlooked in discussions of the use of digital technologies in school" (Selwyn et al, 2016: 391).

The authors compared two contrasting Australian secondary schools: a rural, lower socio-economic setting and a more affluent, urban school. They were able to capture the lived experiences of 34 teachers using semi-structured, in-depth individual interviews. In doing so, their study revealed the diverse ways teachers use technology extending beyond pedagogical applications to include administrative tasks, communication and professional development.

In discussing their findings, Selwyn et al (2016) acknowledge the influence of school context on teachers' technology use. They argue that digital repertoires are not developed in isolation but are shaped by the specific environment in which teachers work. Factors such as school culture, available resources and leadership support all play a role in shaping the digital repertoire of teachers within a particular school. As such, the authors found that the rural school, with fewer resources, faced greater challenges in supporting effective technology integration.

Selwyn et al (2016) also focused on the many technology-use challenges facing the 34 teachers. These included technical difficulties, workload pressures, and concerns about learner access and equity. Some also expressed anxieties about the changing nature of their work and the potential for technology to erode their professional autonomy. The study found that while all teachers used technology to some extent, the level of integration and sophistication varied considerably. Some teachers embraced technology enthusiastically, while others adopted a more cautious or instrumental approach. The authors note that the constant negotiation between the demands of the job and the available technological resources shapes the repertoire organically.

One of the main points of emphasis of their study that informs my research, is that technology serves primarily as a tool to support existing practices rather than fundamentally transforming teaching and learning. As Selwyn et al (2016) note in their conclusion, while technology offered new possibilities, it was largely integrated into traditional pedagogical approaches (Selwyn et al, 2016: 403).

My research has also been influenced by Burnett's (2014) study into the concept of (im)materiality in the context of 21st-century literacy practices. She argues for moving beyond simple binary distinctions between online/offline or on-screen/off-screen, proposing instead a focus on the reflexive relationships between the material and immaterial aspects of meaning-making. By "material," Burnett (2014) refers to the tangible elements involved in literacy practices. For her, this includes physical objects like texts, artefacts, bodies, and even the architecture of spaces where literacy practices occur. The "immaterial," on the other hand encompasses intangible elements such as feelings, purposes, memories, and thoughts. Burnett's (2014) work also introduces the notion of the "hybrid site," which she sees as a conceptual space where these material and immaterial elements intersect and interact in complex ways to shape meaning-making (Burnett, 2014: 6).

Burnett (2014) employs a qualitative, ethnographic approach to investigate meaning-making using digital technologies. Her research was conducted in a single primary classroom involving two learners (aged 10 and 11) during a lunchtime *Minecraft Club.* She used a variety of methods to gather rich, detailed data about the learners' literacy practices including observations made through video recordings, individual and group interviews.

Of relevance to my research are Burnett's (2014) findings which explore the complex and interwoven nature of material and immaterial aspects of meaning-making in digital environments. She observes how the two learners' physical interactions with technology, their emotional responses, their social interactions, and their prior experiences all contribute to their understanding and interpretation of digital texts. Her study reveals how meaning-making extends beyond the confines of the screen and is shaped by a range of factors, both tangible and intangible. Burnett's (2014) analysis of the *Minecraft Club* episode demonstrates how learners draw on their knowledge of popular culture, their friendships, and their individual interests as they engage in collaborative meaning-making within the virtual world. It also highlights the importance of the classroom as a social space where learners interact with each other, their teachers, and the learning materials. These interactions shape their understanding and interpretation of texts: "...meaning-making in classrooms is likely to be shaped (at least partly) by the process of being and becoming, by what matters in the moment" (Burnett, 2014: 6).

Burnett's (2014) research has significant implications for the digital repertoire of teachers. Her findings highlight the need for teachers to develop a more nuanced understanding of literacy in the digital age, moving beyond traditional notions of reading and writing to encompass multimodal meaning-making. According to the author, teachers must recognise the complex interplay between material and immaterial factors in learners' learning experiences. They must acknowledge the influence of physical interactions, emotional responses, social dynamics and individual interests on their engagement with digital texts. She argues that this understanding requires a shift in pedagogical approaches and goes on to encourage teachers to create learning environments that support collaborative exploration, critical thinking and creative expression in digital spaces. This implies that teachers need to develop their own digital repertoires. They need to expand their skills and knowledge in using digital technologies as well their ability to analyse and interpret the complex ways in which learners engage with these technologies.

2.8 The digital repertoire as unit of analysis

In the context of my research then, the *digital repertoire* functions as a unit of analysis. A focus on teachers' digital repertoires will provide my research with qualitative data that can be analysed in order to gain insight into how teachers' literacy practices and pedagogical approaches are impacted by their engagement with digital technology. It will pay attention to

such key components as teachers' awareness and familiarity with digital technologies, as well as their beliefs and attitudes towards the use of these technologies in the classroom. Teachers' digital repertoires also include their proficiency with digital tools and technologies, their understanding of how these tools can be used to support and enhance learning, and their ability to adapt and innovate pedagogical practices through the integration of digital technologies.

Teachers' digital repertoires are presented as varied and unpredictable. A central pattern that emerges through the review of the literature above, holds that some teachers may have a high level of proficiency with technology and regularly use it in their teaching, while others may be less comfortable or experienced and may require additional support and training to effectively incorporate technology into their practice.

As highly multimodal entities, Merchant (2021) points out for example that modern digital devices require additional levels of competencies that make the act of text production and consumption more complex. Users are required to have device-specific knowledge i.e. they often need to be able to know how to navigate their way around the technology (hardware interfacing with software) that underlies the user-interface in order to achieve a desired communicative or social outcome. Merchant refers to this as a 'repertoire of concepts of screen' (Merchant, 2021: 103).

In addition, the literature review also reveals that teacher repertoires are impacted by the constraints that exist within the socio-material context of the school domain. Where schools do not have the necessary resources or infrastructure to support the integration of digital technologies into teaching and learning, teachers' ability to fully incorporate digital technologies into their pedagogical practices may not be realised. The norms, values and expectations present within the education system also present a challenge for the development of emerging teacher repertoires.

2.9 Conclusion

The interconnected socio-material theories of spatiality, assemblage and affect offer a valuable framework within which we can observe, describe and analyse the complexities of teachers' engagement with digital technology in educational settings. In this paradigm, the classroom is viewed as a dynamic and complex ecosystem where social, material and affective factors intersect. It is also the space where teachers' digital repertoires emerge *in situ* as they interact with a range of resources across various semiotic modes. In this context, the digital repertoire

provides a lens through which we are able to gain personalised insight into the lived experiences of teachers as they seek to navigate their way through the myriad of affordances and constraints presented by digital technology. The following chapter will detail the methodological approach employed in this study, outlining the ethnographic research methods as well as the qualitative data analysis techniques used to investigate these lived experiences captured within specific classroom contexts.

Chapter 3: Research design and research methodology

3.1 Introduction

In this chapter I will present my research design. I will describe the site for my case study, outline what data I collected and explain how I collected it. Finally I will describe how I analysed the data and show how the data analysis followed from the theoretical framework set out in the previous chapter.

3.2 Research design

My research project focused on exploring the digital repertoires of two Grade 4 teachers in a working class school situated on the Cape Flats. I was able to observe and analyse how the complexities of their entanglement with digital technology produced unique, affected responses that complicated their approach to and understanding of their roles as teachers. I used a single case study design and took an ethnographic approach in using a range of data collection methods in order to harvest as much rich and detailed information about their experiences as possible. This information shed light on the key components of these teachers' emerging digital repertoires and allowed me to gain insight into how they were able to navigate their way around their perceived constraints and affordances of digital technology in the process of teaching.

Case study research is a qualitative research methodology that Hammersley et al (2012) describe as a ‘flexible’, ‘subjective’ and ‘adaptive’ form of social inquiry aiming to track the unfolding of real events in a social setting (Hammersley et al, 2012:12). These elements align with the New Literacy Studies (NLS) approach which encourages researchers to adopt a holistic view of literacy and to employ a variety of qualitative techniques to capture the complexity of how people engage with and make meaning through literacy in their everyday lives. As Yin (2014) points out: "Case studies are invaluable for in-depth exploration of complex phenomena *(such as the digital repertoire)* within their real-life context. They provide an opportunity to examine 'how' and 'why' questions in their natural settings." (Yin, 2014:4). I situated the case study research design within a qualitative, ethnographic approach. Ethnographic research focuses on understanding participants' perspectives, experiences, and meanings they ascribe to certain phenomena within a socio-material context: "(It) allows us to enter the world of participants, to explore the intricate ways in which they make sense of their lives and the complex social realities they inhabit." (Creswell and Poth, 2017:45). It also affords researchers

the opportunity to gain insight into how culture, norms, values, and social structures influence behaviour and beliefs

The epistemology of a case study design emphasises the importance of studying phenomena in their natural context, valuing qualitative data, and seeking a deep and holistic understanding of the cases under investigation. It recognises that knowledge is context-dependent and that complex phenomena cannot always be reduced to simple variables (Merriam, 2009). Generalizability in qualitative research is not about making universal claims, but about providing insights, theories, or lessons that can inform or be transferred to similar situations or contexts (Creswell, 2013).

In my research, the case study allows for conclusions about the presence of digital technology in education to be drawn that can influence theory and policy development. By tracking the digital repertoires of my two participants as they moved through their learning spaces and over time, I could begin to observe the consequences of a deterministic approach to technology integration in schools unfold in real time and note its impact on the teachers' autonomy and their sense of professional identity. I could begin to connect this approach to such broader issues as: the obscuring of the ideological impact of technology, the distortion of socio-material realities and the negation of the complexities of viewing literacy as a socially situated practice.

3.3 The case

I defined the case for this study as an exploration of the digital repertoires of two Grade 4 teachers at a Cape Flats Primary School. This involved observing and tracking their use of digital tools such as smartphones, laptops, digital projectors and specific software applications, alongside gathering their perspectives on using digital technology through interviews, diaries, and reflections on their classroom practices. My approach allowed for a comprehensive understanding of how these teachers integrated technology into their teaching and the impact it had on their pedagogy and learners' learning experiences.

I viewed this case as a way of obtaining and constructing data about the different strategies, methods and tools which these teachers use in the process of taking hold of technology in their daily teaching. I chose to do my research in a Quintile 3[1] working class school where the

[1] *Quintile 3* in South African schooling refers to the middle quintile of state schools, representing the middle 20% of schools in terms of socioeconomic status. These schools typically serve communities with moderate levels of poverty and have a greater variation in resources and infrastructure compared to schools in higher or lower quintiles.

confluence of a number of profound social and material divisions play an important role in determining its digital footprint and the kinds of digital literacy practices that exist in the classroom as a consequence.

3.4 The participants

The two teachers, whom I shall refer to as Jay and Vee, have 5 and 7 years of teaching experience respectively, all of which has been filled in teaching Grade 4 at this school. Jay is a single 29 year old male and Vee is a married 33 year old woman with two young children. They volunteered to participate in my research because they perceive themselves as having a committed interest in developing a better understanding of their subjective experiences of their investment with technology. They were also interested to meet me both in my role as an ex-teacher and as a researcher with the view to gleaning ideas, insights and suggestions from me.

3.5 Data collection

Case study research allows for flexibility in data collection and analysis, enabling researchers to adapt to changing circumstances. My fieldwork took place over a three-week period during February 2024 and entailed shadowing Jay and Vee for 3 hours per day over three days each. During this time, I was able to collect qualitative data through classroom observations, in-depth interviews, artefact documentation and the scripting of a digital diary.

In meeting my two volunteer participants for the first time, I opted for an unstructured interview that unfolded as an informal ‘chat’ circling around my teaching background and an explanation of the purpose of my research. I felt that this would help me to establish a more organic rapport that is often the basis for building trust. I avoided using such research tools as notes and a recording device which could have a constraining effect. As Copland (2017) points out, participants are not subjects of research, but are individuals. Therefore, moral considerations in ethnographic research should typically include issues such as ensuring that participants are treated ethically, that their confidentiality is respected, and that the research is conducted with integrity and transparency. Unstructured, informal interviews and conversations allow for a more natural and possibly more honest sharing of participants' thoughts and experiences (Copland and Creese, 2017: 14). During the conversation, both Jay and Vee insisted on confidentiality and that the research would not mean extra ‘work’ for them. Other than these two areas of

concern, I noted a sincere willingness on their part to have me gain access to their classroom spaces.

Classroom observations provided a rich source of data and allowed me to gain insight into the real-time dynamics of pedagogical practices involving digital devices and to map each teacher's digital repertoire in context. I observed Jay and Vee in their classrooms for two hours per day 'tagging along' to other spaces used for school assemblies and Physical Education. I was able to capture some key class-based moments using my smartphone's video recorder and camera. Video recording can provide a way to review an observation in more detail afterwards, capturing nuances not immediately noticeable during the on-the-spot observation. I found this to be especially useful in seeing the subtle ways digital technology is incorporated and how it affects the classroom dynamics.

In addition, I kept detailed fieldnotes in which I recorded classroom activity, noting the use of digital technology, interactions, activities, teacher instructions, learner responses, and any other relevant details. This reflected my understanding and interpretation of what I was able to gather through the senses. I supplemented these with post-observation notes, 'go-along' discussions (Copland and Creese, 2017) and *WhatsApp* chats. Fieldnotes stand as a cornerstone of ethnographic research, offering the researcher a tangible means to document and reflect upon the observations made. Emerson et al argue that fieldnotes require meticulous attention to detail if the researcher wishes to capture the intricacies of social life that are embedded in observed behaviours, interactions, dialogues, and settings.This practice enables a richer, more nuanced account of the research context, contributing to both the depth and credibility of the findings (Emerson et al, 2011).

I conducted a semi-structured in-depth interview with both Jay and Vee after the classroom observation sessions had ended. I constructed 20 open-ended questions covering such salient aspects as the digital repertoire, pedagogical approaches, constraints and affordances, learner engagement, digital citizenship, reflection and future outlook (see Appendix 2). In order to gather the data, I used my smartphone as a recording device. Its presence in this social situation could create what Jenkins, citing Purkarthofer, (2019) references as an 'on-the-record/off-the-record' dynamic "when people are aware that what they are saying is being recorded and can feel inhibited in what they are willing to divulge" (Jenkins, 2019:32). I noted that both Jay and Vee felt comfortable enough with the interview to express opinions and perspectives that I judged to be frank and honest.

Another rich data source emerged from my participants' Digital Diary. The Diary is a method of capturing real-time, everyday subjective experiences and practices which participants might usually overlook or take for granted, providing a rich and holistic view of their digital repertoire. At my request, both Jay and Vee documented their use of digital technologies over a three-day period. I had to be sensitive to the demands of this task, given their workload commitments. In the end, three days constituted a reasonable time period. I asked them to keep track of the frequency and purpose with which they engaged with digital technology. They were also asked to reflect on any thoughts, feelings or reactions to using technology both inside and outside the classroom. Finally, I asked Jay and Vee to record their insights about how the technology influenced their pedagogical approaches or literacy practices.

I was also able to obtain lesson plans, curriculum materials and policies from the participants. I was able to examine these to determine how digital technologies are officially incorporated into literacy education at the school and to identify any intended or unintended outcomes.

The data collected amounted to 30 minutes of a recorded interview, field notes of 12 hours, 90 minutes of interviews, 6 hours of diary entries and photographs. The data therefore represents a blend of what the teachers say and feel about their digital repertoires, my written observations and reflections of them in context and the audio-visual artefacts that 'capture what is' in the moment - where that moment was determined by what I decided was notable and relevant to record.

3.6 Data analysis

Data analysis within linguistic ethnography (Copland and Creese, 2015) is a multi-step process that involves collecting data, constructing a suitable data set, examining it carefully, and interpreting findings within the context of the research questions and the broader theoretical framework. This places my case study within an interpretivist paradigm where the method of inquiry centres around the meanings, perspectives and interpretations that the two participant teachers attribute to their experiences and interactions with material and social elements. The researcher operates subjectively by recognising that different individuals or groups may have diverse interpretations and perspectives on the same phenomenon. The challenge for the researcher is to balance being empathetic and connected to the participants while also providing a clear, analytical perspective that is true to the data and maintains academic rigour (Copland, 2017).

To initiate the data analysis, I transcribed the interview and coded the data to identify recurring topics, categories, and patterns within the participants' responses. From this coding process, I identified two main lines of inquiry that permeated the data and this influenced the selection of my data set for analysis. The first entailed the participants' preoccupation with the operational aspects of digital technology - the 'how-do-we-do-this?' part. Jay and Vee often spoke positively about developing the necessary knowledge and skills that would enable them to integrate digital technology successfully into their teaching practice. However, their comments would invariably be punctuated with concerns about the impact of very real material resource limitations that cloud their school domain. This allowed me to look for the ways in which they were able to adapt to and negotiate the affordances and constraints of technology in their teaching. It also meant that I had to pay attention to the material affordances of technology, such as software, hardware, and digital resources, in shaping the types of literacy practices that unfolded in the classroom.

The second recurring topic involved their affected responses in situations where technology was perceived as 'blurring the lines' between work and personal life and where socio-material limitations led to 'unfulfilled potential'. I identified extracts that revealed heightened levels of anxiety and frustration as Jay and Vee spoke about the 'blurring of boundaries'. This allowed me to identify how they express concerns about and mediate issues such as data privacy, digital equity, and the ethical use of technology in the classroom. I also looked for instances in the data where Jay and Vee were specifically able to acknowledge and identify the material limitations experienced, which I separated into three types: infrastructure, skills and structural inequality. There were a number of significant moments where both participants spoke about the frustration they experienced where, despite the digital skills training they received, they were unable to transfer their knowledge to the classroom.

My analysis of the data was influenced by a socio-material approach that draws on the sensitising concepts of assemblage and affect. This entailed focussing on the way in which people, material objects, digital technologies, and the physical environment intertwine and mutually shape each other in the production of literacy practices. When analysing the data through the lens of assemblage theory, I mapped the entangled, complex relationships that unfold as teachers, learners, material objects (like digital devices or classroom texts) and discourses interacted and collaborated within the classroom space. I remained alert to the fact that assemblages are not static and will change as elements enter, leave or change. I also considered how the assemblage reinforces or inverts existing social structures and ideologies.

Through my fieldnotes, I was able to record instances where Jay and Vee displayed affected responses towards their use of digital devices during lessons. I was also able to capture the contingent responses of the learners. My interview with Jay and Vee contained a number of moments where they expressed their thoughts, feelings and concerns about their experiences with digital technology and how these influence interactions and practices. Coding the interview allowed me to move past the words and to view their below-the-surface, embodied emotional experiences. The flexibility of a case study approach allowed for the inclusion of elements of multimodal analysis where I considered not just what is said but how it is communicated through multiple modes (e.g., visual, spatial, gestural, linguistic).

Here I had to concede that people may not always express themselves clearly or transparently through their words. There may be hidden agendas, underlying emotions, or social dynamics at play in the conversation that may not be evident to the researcher from a literal reading of the transcript.

By analysing the recorded data, I aim to provide evidence of what these teachers say they can do with digital technology in the classroom. At the same time, it exposes what they authentically can do and then seeks to explain the tensions and contradictions that arise as a result. Employing a multi-methods approach incorporating observational data alongside interview data allows for a comprehensive understanding of both the teachers' perceived abilities and their actual practices with digital technology, thus providing a richer analysis of the potential discrepancies between the two. My data analysis also taps into evidence of reflection where Jay and Vee are able to shed light on why they do what they say they do (with technology) and why they are unable to do what they say they cannot do. My research design is aimed at revealing their relationship with technology as entangled, deeply affected and ambiguous - “liberating and democratising on the one hand and yet exploitative and disempowering on the other.”(Selwyn et al, 2017: 403)

(.)	Short pause
(…)	Longer pause
[laughs]	Non-verbal behaviour
(↓)	Falling intonation
(↑)	Rising intonation
underlining	Indicates emphasis on a word or phrase
//	Overlapping or simultaneous speech
(unclear)	Unintelligible
>	Faster speech
<	Slower speech

3.6 Transcription symbols

3.7 Ethical considerations

It was important for me to ensure that my research respected the rights, privacy, and well-being of the participants. To do this, I obtained written consent from Jay and Vee after an introductory meeting with them in which I was able to provide clear and comprehensible information about the study's objectives, data collection methods, potential risks, and benefits. I emphasised that their participation was voluntary, they had the right to ask questions and could withdraw from the study at any point without repercussions. They requested anonymity because they were ‘uncomfortable’ with their names being ‘printed in a study’. Jay and Vee felt at ease once I reassured them that privacy and confidentiality would be guaranteed. (See Appendix 2 for copies of the information letter and consent form used.)

3,8 Conclusion

In this chapter I have outlined the research design employed, focusing on a single case study approach with ethnographic methods to explore the digital repertoires of two Grade 4 teachers. The data collection methods included observations, interviews, and a digital diary to gather rich information about their experiences with technology integration. This information is used to analyse the key components of the teachers' emerging digital repertoires and how they navigate the perceived constraints and affordances of digital technology in their teaching practices.

In the next chapter, I will present data from my fieldnotes, transcribed interviews and the digital diary to describe the complex interplay between the beliefs, perceptions, skills, and the contextual factors that influence my participants' engagement with digital technology. I will also flesh out the socio-material and ideological factors which shape the diverse ways in which the digital repertoire emerges as Jay and Vee attempt to make sense of how they use digital technology. The analysis will also show (qualitative data) how these teachers' literacy practices and pedagogical approaches are affected or unsettled by their engagement with digital technology.

Chapter 4: Introduction to the Digital Repertoire

4.1 Introduction

As I discussed in Chapter 2, the digital repertoire can be defined as an extension of the spatial repertoire into the digital realm. This suggests that the ways individuals communicate and interact in physical spaces are carried over into and transformed when they engage in digital environments. It is not simply about using technology but about how existing communicative practices are adapted and reshaped in the digital context. Language, gestures, and other resources used to communicate in physical spaces do not disappear online but are adapted to the digital medium.

In this definition, the digital repertoire is not regarded as separate from the physical or material world but interacts with it in complex ways. Digital tools can mediate physical interactions, such as using a shared online document for collaborative writing. Just as spatial repertoires are situated within specific physical contexts, digital repertoires are shaped by the particular digital environments in which they are enacted. The norms and practices of a social media platform for example, differ from those of an online learning management system. Individuals adapt their digital practices to these different contexts.

For my research, the digital repertoire provides a lens through which teachers' subjective experiences of their entanglement with technology can be viewed, particularly when immersed within a school domain. It encompasses the situated practices and meanings teachers attach to digital technology within their specific classroom spaces. It goes beyond technical skills to include considerations of how teachers navigate, leverage and make sense of available digital resources for communication and learning. The repertoire reflects a need by teachers to *take hold* of technology in some way as an expression of a greater need to feel effective, relevant, and adaptable in an increasingly digital world (Hänninen et al, 2021:570).

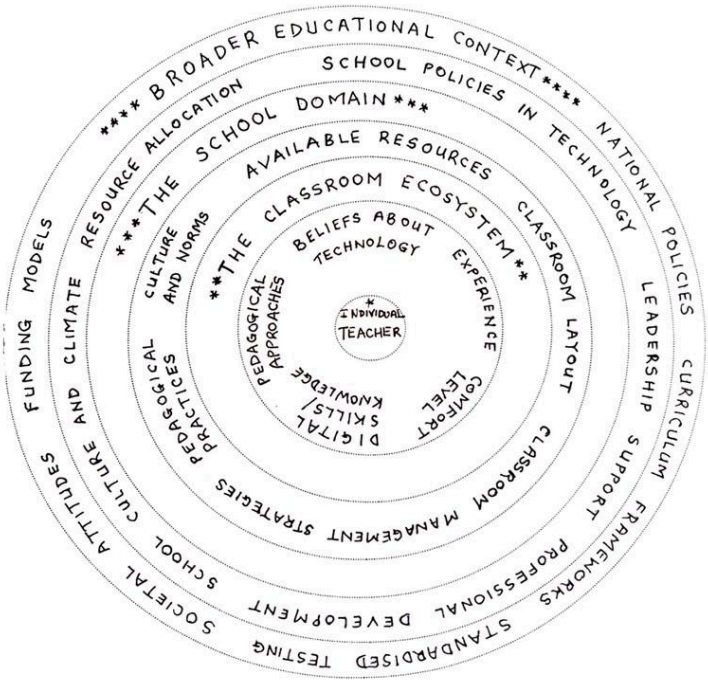
This chapter then aims to answer Research Question 1 by identifying and exploring the key components of both Jay and Vee's emerging digital repertoires in the context of a resource-constrained school domain. In doing so, it also aims to examine how the affordances and constraints of specific technologies, intertwined with the social and material conditions of the school environment, influence the development and enactment of their digital repertoires (Research Question 2). I will present a nested circles model (4.2.1) as an analytical tool and a data table of digital repertoire components (4.5.1) as a summative description of the practices

which I have observed. These two visual representations will, in combination, provide a multi-dimensional view of Jay and Vee's digital repertoires.

The data table's structured approach allows for a granular analysis of an individual teacher's digital repertoires, capturing specific skills, practices, beliefs, levels of access and adaptation strategies. This detailed, component-based view will provide concrete examples of how technology is used (or not used) in specific contexts, highlighting individual differences and shared challenges. However, simply listing these components does not fully explain the complexities of technology integration. This is where the nested circles model becomes important. It provides the context by situating these individual repertoires within a broader ecosystem of influences. The model acknowledges that technology integration is not solely determined by individual skills or preferences, but is shaped by a complex interplay of factors at the classroom, school and broader educational levels (Prinsloo, 2015).

In resource-constrained environments, this combined approach becomes particularly powerful (Darvin, 2018a). It allows us to move beyond simplistic narratives of 'lack of access' or 'teacher resistance' to understand the nuanced ways in which limited resources, policy decisions and individual choices intersect to shape technology integration. It highlights the creative adaptations teachers employ to overcome challenges, the systemic barriers they face and the potential points of intervention for meaningful change. By providing an interconnected view of technology integration, this framework allows for an analysis that explores how teachers leverage their digital repertoires to navigate the specific affordances and constraints presented by resource-constrained environments.

4.2 Visualising im/material influences - a nested circles model



4.2.1 Diagram - The Nested Circles Model of im/material influences on digital repertoires

The nested circles model is adapted from Bronfenbrenner's Ecological Systems Theory (1979) and provides a framework for understanding the im/material influences that shape technology integration in school settings. It visually represents these influences as a series of concentric circles, each representing a different level of impact, from the individual teacher at the centre to the broader educational context at the outermost layer. As we shall see in the case of load-shedding, this level might also be heavily influenced by non-education state policies that nevertheless have socio-material influence on what happens in the classroom. The lines separating the levels are dotted, which indicates the interconnected nature of the relationship between the levels. This will allow us for example to see how the absence of a school's ICT policy (third circle) might limit a teacher's ability to use technology in the classroom (second circle), which in turn might affect the individual teacher's willingness to experiment with new pedagogical approaches (inner circle). Conversely, a supportive school environment (third circle) might empower teachers to integrate technology effectively (second circle), leading to increased learner engagement and improved learning outcomes (inner circle).

The Individual Teacher is at the centre of the model. This level represents the teacher's personal beliefs about technology, their technological skills and knowledge, their pedagogical approaches and their individual experiences with technology integration. These individual factors play a crucial role in shaping how teachers perceive and utilise technology in their classrooms. At the individual level, a teacher's comfort with technology, shaped by their prior experiences and professional development opportunities, acts as a primary filter through which external influences are interpreted (Tour, 2015). A teacher with limited technical skills, for example, might perceive a new software platform as a constraint, even within a supportive school environment, while a tech-savvy teacher might view the same platform as an affordance for innovative pedagogy. This individual lens then interacts with the immediate classroom context.

The next level represents the classroom environment and includes factors such as the physical layout of the classroom, the availability and accessibility of technology resources (computers, software, internet access), the classroom culture and norms around technology use, and the specific pedagogical practices employed within the classroom. These classroom-level factors can either enable or constrain a teacher's ability to effectively integrate technology.

The third level represents the broader institutional context in which the classroom is situated. . This includes factors such as school policies regarding technology use, the level of administrative and leadership support for technology integration, the availability of professional development opportunities and the overall school culture and climate towards innovation and technology adoption. Here, we are reminded that a school's socio-material context influences the use of technology (Prinsloo, 2019). The school environment plays a crucial role in shaping both individual and classroom-level dynamics. A school culture that values innovation and provides ongoing professional development for example, can empower teachers to overcome individual limitations and maximize classroom affordances. Conversely, a school with limited resources and restrictive policies can stifle even the most enthusiastic teachers, creating systemic constraints that outweigh individual and classroom-level factors.

The outermost layer represents the broader educational context and includes curriculum requirements, assessment policies, funding priorities and societal attitudes towards technology in education. These broader contextual factors create the overarching environment within which schools and teachers operate, influencing the priorities, opportunities, and challenges related to technology integration.

4.3 The Digital Mindset - navigating affordances and constraints

Since Jay and Vee are the focus of my research, my data analysis starts at the individual level of the nested circles model. Their beliefs and attitudes about the role of technology in education heavily influence how they approach technology integration in their classrooms. Despite working within the same resource-constrained environment, their digital repertoires emerge in distinctive ways. The data table shows that they both believe that technology, if integrated correctly, can be a powerful tool for enhancing literacy and learning in the classroom. To support this observation, I draw on two extracts from my interview with Jay and Vee in which they speak about their perception that the use of digital tools and access to the internet adds value to their teaching:

"It's a great help.. a great help it enhances it enhances [reflective tone] what I can do (↑). for instance my brain is limited to a certain capacity (.) with a machine in my hand depending on my input I can literally find any information that I'm looking for (↓). ja… so even if it's discipline(.) [regular tempo] I have the police or mommy's number I have everything in my hand so.. <so it's a huge extension of what I am able to bring to the children.. without technology it's literally a quarter of what I can provide for them(↓)" [Jay, Interview, #53: 050424]

"the internet just gives a broader explanation.. broader mindset.. they just build learners uhm knowledge based on the videos that I google.. " [Vee, Interview, #12: 050424]

In the first extract, Jay speaks about technology as an *'extension'* of his cognitive abilities. It gains both symbolic and material value for him. It appears as if he is suggesting that technology is, in some way, a physical extension of the body. This integration of technology with the human body has given rise to the concept of 'mobiquity' where the ubiquity of the internet and the mobility of smartphones have converged to create a new digital ecosystem that is inextricably linked to our physical existence. Interestingly, the influence of mobile phones on our cognitive processes has been mapped in a study by Ward et al, (2017), in which they show that the mere presence of a smartphone can reduce the available cognitive capacity, as our attention is divided between the physical and digital realms. (Ward et al., 2017)

In line with this, Jay acknowledges the significant benefits that technology brings to his teaching capabilities. When he says - *'It's a great help.. a great help it enhances it enhances'* - the repetition emphasises that he embraces all the positive affordances of technology. As he launches into an explanation, his enthusiasm is palpable and is reflected in the rise in intonation - *'what I can do (↑)'?* Jay recognises that his personal knowledge has limits - *'my brain is limited to a certain capacity'* - and employing technology, such as a computer or a smart device, extends his capacity to provide information. He suggests that with technology, he can access nearly any information he needs, which can also help in classroom management and discipline, such as having contact information for parents or authorities like the police if necessary. For Jay, technology has tangible value as an educational resource, suggesting that without it, he would only be able to offer a fraction, *'literally a quarter'*, of potential learning opportunities to his learners. It is seen as an indispensable tool that greatly enhances what he can deliver inside the classroom. Without it, Jay feels inadequate. This extract reflects how the interconnection of social practices (teaching, discipline, communication) with material artefacts (technological devices) creates a powerful combination in shaping a perception that technology enables a richer, more expansive educational experience for both the teacher and his learners.

In the second extract, Vee explains that she accesses the internet when she needs to provide a more extensive or broader explanation of concepts that she may have difficulty conveying. The repetition of 'broader' in this phrase - *'broader explanation.. broader mindset'* - reflects Vee's understanding of the internet as expansive and serving as more than just a tool for accessing information. She sees its presence as having a positive influence on the 'mindset' of her learners as it facilitates a wider range of perspectives and learning resources compared to traditional educational settings. Vee's reference to 'Google' and 'videos' indicates the

significance of this platform in shaping her teaching practices and her perception of what learners encounter and how they learn.

Tour's (2015) notion of the *digital mindset* has relevance here. The concept is based on the observation that individuals' values and beliefs shape their interactions with technology, leading to unique digital literacy practices. In line with Tour's research findings, Vee and Jay can be viewed as possessing a positive digital mindset. Their broad digital repertoires are influenced by their active personal and professional use of technology and they appear to be comfortable and experimental with technology in their teaching. We see evidence of this in Jay's enthused attitude towards technology, believing it to be an *extension* of himself. We also see this reflected in Vee's belief that her leveraging of the internet is for a higher cognitive purpose in that it helps to *broaden the mindset* of her learners. The digital mindset is an intrinsic part of the digital repertoire here. It contextualises the decisions that Jay and Vee make as they consciously seek ways in which technology can add value to and expand their range of pedagogical practices and resource utilisation.

The components table (4.5.1) also reveals that their individual relationships with technology are distinct. Jay's is marked by a certain tension; he embraces its potential but struggles with the blurring of boundaries between work and personal life, feeling the pressure of being 'always-on.' Vee, while enthusiastic about technology's empowering capabilities, maintains a more cautious and pragmatic stance, influenced by her inability to use her knowledge and skills as fully as she would like**.** Supporting evidence for this observation will be presented in 4.3.2 where Vee speaks about her views on digital intervention programmes.

4.3.1 Jay as the 'ICT champion'

The following extract from Jay's digital diary captures the difficulties he experiences in reconciling his position as a de facto *ICT champion* with his day-to-day teaching responsibilities:

> *Day3: 09:00 – I have just settled my learners as I gave them an activity to do, suddenly, I am called out of my classroom to assist a fellow colleague with internet connectivity issues…I'm not comfortable leaving my class unattended."* [Jay, Diary entry #3: 250424]

This extract reveals the tensions that emerge when Jay is caught between assisting a colleague with a tech-related request and being drawn away from his core teaching responsibilities. While he does not continue to reflect on this moment in his diary entry, it appears that he responds to

these ‘callouts' by colleagues based on their expectations of him. Whether intentionally or not, Jay has positioned himself as a knowledgeable IT person, an indispensable ‘resource’ in a school which has significant digital limitations. During the time spent observing Jay, I noted that he would be interrupted during his lessons from time to time, either via a messenger or via a text message [Fieldnote #3.120224]. He gave staff IT-related requests priority and would respond immediately to queries via email or WhatsApp. Only on one occasion did I observe him leaving his class to assist a colleague who was struggling to connect her laptop to a data projector. On his return, he reflected that this was a problem which, in his estimation, could be quickly resolved. Leaving his class unattended, even for a short while, results in a conflict of interest for Jay and his diary entry reflects his palpable discomfort. His positionality as the ‘ICT champion’ has a clear impact on the decisions he makes in response to staff expectations, reflecting the ambivalence that emerges when boundaries become blurred by unrestrained digital practices.

Where teaching is conceptualised as an immaterial form of labour, Selwyn et al (2016) argue that technology can be both *oppressive* and *liberating* for teachers (Selwyn et al, 2016: 401). In Jay's case, his tech skills, while potentially empowering, become a source of oppression as they lead to increased demands and interruptions. He appears trapped by the expectation that he will always be available to provide tech support, limiting his ability to focus on his core teaching responsibilities. The notion of *positionality* as expanded on by Selwyn et al (2016), holds that teachers' experiences with technology are shaped by their positionality within the school, including their status, gender, age, and career stage. As they integrate technology into their practices, teachers develop new ways of working and interacting with learners and colleagues. This can lead to shifts in how teachers perceive their roles and their professional identities (Selwyn et al, 2016: 402).

When Jay assumes his role as the ‘ICT champion’, it comes with the burden of increased expectations and demands from his colleagues. For Jay, this practice feels as though it has become entrenched as part of the school’s culture (level 3). By relying on him for IT assistance, they effectively delegate tasks to him, exacerbating existing workload imbalances. In the context of his school, this redistribution of work is not formally recognised or compensated, further contributing to the pressures Jay already experiences. His willingness to respond to these demands may be influenced by his desire to maintain this position and fulfill the perceived obligations associated with it. From this perspective, the observable tension in Jay’s digital

repertoire stems from his inability to reconcile the contradictions that arise between his perceived professional responsibilities (individual) and the social expectations (society) and material circumstances (school) that shape his work experiences.

4.3.2 Vee's view on digital intervention programmes

At an individual level, Vee's digital repertoire is influenced by the IT integration training courses which she has completed over time In the following extract, she speaks about the sense of empowerment and excitement she felt after completing such a course:

> *"Yes I've done a course on at [unclear] uhm how to integrate technology in the classroom.. that was in last year. (↑) uhm [regular tempo] I must say the lessons that they give is spectacular. (↑) I've learnt such a lot but I would have like to be more [rising pitch] I would like to be [unclear] classroom set up because this is online.. I felt empowered… although although I must add. I don't use that knowledge in the classroom.. I need to learn how to use the software I have installed like the extension I have installed on my computer. but I want to bring that to class… so.. yes we have done the training the lady came out and she done the training, but we personally haven't used the programme (↓) because it takes a while to to use a programme the software//"* [Vee, Interview, #32: 050424]

The 'training lady' is a reference to a WCED-appointed ICT trainer who spent time with 10 of the teachers at the school in August 2023, during which time she showed them how to use the learning management system (LMS) called *Moodle*. This software is open-source and therefore free to use.Vee's choice of adjectives like *'spectacular'* and *'empowered'* reflect the positive impact of this training on her. However, when she confirms that she has not transferred *'that knowledge'* to the classroom, it is said with visible frustration and disappointment. This affected response seems to stem from her inability to allocate sufficient time to become familiar with use of the software in context. While not explicitly stated in this extract, but rather based on what I have observed, Vee's operational limitations with technology is amplified by her feeling pressured by the time constraints imposed by the demands of the curriculum (the outer circle).

Despite attending the training, the complexity posed by the software (and the time required to become familiar with its use in the classroom) interacts with Vee's competencies and willingness to engage with the technology, affecting its integration into regular teaching practice. This reflects a socio-material gap where the material reality of the technology's complexity does not entirely align with the social reality of everyday teaching. The gap between the training provided

and its practical application in teaching practice can become a source of antipathy for many teachers. It can also lead to what Prinsloo and Sasman (2015) refer to as a "disproportionate focus on basic literacy skills" in which teachers prioritise print-based literacy at the expense of other literacies (Prinsloo and Sasman, 2015: 17).

4.4 Classroom spaces influence the digital repertoire

The classroom space (placed at level 2 on the nested circles model) has a significant impact on the kinds of digital practices that Jay and Vee are able to engage in. By bringing together Darvin's (2018a) definition of the digital repertoire with Canagarajah's (2017) notion of the spatial repertoire, the classroom as a material ecosystem becomes more than just a physical space when digital resources, devices and online tools are present. When Jay and Vee integrate technology into their teaching practices, they activate a digital repertoire that combines physical, digital and social factors that shape teaching and learning experiences in that space. The classroom represents the space where material elements such as laptops, projectors, and digital content and immaterial factors such as the interactions between the teachers and their learners, cultural and environmental factors and the ambiance of the physical learning space dovetail. The aim here is to explore some of the main affordances and constraints experienced by Jay and Vee (individual level) as they draw on a range of available resources across various semiotic modes to engage their learners. This in turn gives their classroom spaces their own unique 'look and feel'.

Following Burnett's (2014) framework, I view the classroom as a 'hybrid site' ideally suited for observing not only how these material and immaterial dimensions intersect and influence learning, but also how shared meaning-making occurs through social interaction. When learners engage with digital technologies alongside traditional print materials for example, it creates a blended learning environment where the boundaries between the physical and digital blur. This observation is consistent with Burnett's (2014) construction of the classroom as a social space where learners interact with each other, their teachers and the learning materials. These interactions in turn shape their understanding and interpretation of texts (Burnett, 2014: 6). To assist my analysis, I will draw on the notion of classroom *ecologies* which links to the concept of *assemblage*, in that it recognises the classroom as a complex, dynamic system comprising various elements that interact and affect the learning process. In this space, both teachers and learners can be viewed as active agents who shape and are shaped by elements in their

environment, establishing a feedback loop between practice and technology use (Burnett and Merchant, 2018).

In the following extract, Vee speaks about the strategic leveraging of the rich, multi-sensory affordances that digital technology offers. It reveals much about why she views this as an *"advantage"*:

> *"you see because they are tired of my voice.. (↑) they would like to hear a different voice (.)" and then again: "Yeah it. it. it captures their. their attention [softer]. they are really calm and quiet (↑)... they want to see this pictures and the words.. they wanna.. they don't wanna hear my voice or sirs voice all the time [rising pitch] so the voice captures their attention and that's one advantage I can say… so they are really into this picture that they are seeing (↓)"* [Vee, Interview, #23: 050424]

Vee Is able to reflect on what she experiences as the positive effects of using visual elements like pictures and different auditory elements, such as recorded voice narration, during lessons. However, the integration of these multimedia resources appear to serve a number of purposes for Vee outside of achieving pedagogical objectives such as deeper learning. The extract reveals that technology provides Vee with a sense of control in managing her learners' interest and focus on the lesson content. By emphasising *"capturing attention"* in the context of *"they are really calm and quiet"*, Vee's explanation for using technology though, shifts the interpretation away from an image of learners who are genuinely engaged with learning content, to learners who are passively observing.

Vee's comment about learners being *"tired of [her] voice"* points to another perceived advantage. It suggests that she sees a disconnect between her teaching methods and learner engagement. Underlying this view, is an acknowledgement that transmission teaching practices can become monotonous and that the integration of technology can offer her learners a welcome change of pace. The interview extract shows that Vee has a good awareness of the interaction between material tools (images and recorded voices) and the learners' social and emotional engagement in the classroom. These (im)material components offer sensory stimulation that contrasts with the familiarity of the teacher's voice - *"my voice",* indicating that material changes in the sensory environment can have notable effects on learner behaviour and attentiveness (Burnett, 2014). In the following extract from my fieldnotes, I describe a classroom moment in which Vee uses (im)material components to capture or hold learners' attention:

"8:15am

After 10 minutes Vee returns to her table, picks up her smartphone (which is on silent) and replies to three text messages from parents. She informs me that they are notifying her of their children's absence from school for the day. Before returning to her task, Vee switches on her laptop and connects it to the data projector. While the devices are powering on, Vee uses her smartphone to take photos of the worksheets for the day and sends it to the three parents via WhatsApp. She shifts her attention to her laptop and after a few 'clicks', displays a slideshow of a ghost house on the whiteboard. I note that this immediately draws the attention of most of her class…" [Vee in the classroom, Fieldnote #4.190224]

The extract reflects the comfort and operational proficiency with which Vee navigates between digital resources like her smartphone, laptop, data projector, educational software and apps. The technology has become so completely normalised within her teaching routine, that it appears to have almost *disappeared*. What is significant here, is my noted reaction of the learners when Vee displays the slideshow of a ghost house. The learners by and large shift their attention away from whatever they were doing and focus on the whiteboard.

What I encountered within the assemblage of Vee's classroom, is that (im)material resources, including pictures and voices, are not merely tools. They become active participants in shaping the flow of activity and interaction. For example, when Vee uses her smartphone to photograph worksheets so that she can send them to parents via WhatsApp, it is an act that has become a routine part of her job. Here, technology allows the immaterial, external social networks to influence the classroom ecology by extending its reach beyond the physical space. It also demonstrates the fluidity of the assemblage where material elements such as a smartphone can and do take on multiple roles and meanings depending on the context.

When the learners' attention is shifted to the projected 'ghost house' slideshow, it reflects the affective dimension of the assemblage. The visual stimulus elicits a collective emotional and attentional response, demonstrating the power of technological elements to shape the affective atmosphere of the classroom. This shift in attention also highlights the relationality between the learners and the technology, where the projected image acts as a focal point, drawing them into a shared experience.

In contrast to Vee's use of the (im)material to *draw learners' attention*, Jay reports that what he does with technology in the classroom is informed by his future vision. He speaks about this in

the following extract:

> *"I would like to get them like each child has their own workstation. so you get your own notebook… the google chromebook. (↑) so if you need to access the internet if you need anything and you have your own workstation that you can use and your learning materials will be preloaded on your workstation…they all have headphones on and they can all hear my voice. (↓) so that would be my. perfect world. [softer] I would not have to scream I could just have a lapel mic maybe and I could just speak and everyone can hear me and follow the instruction nice and calmly (↓)"* [Jay, Interview, #76: 050424]

Here, he envisions an integrated learning environment where each learner has their own workstation, such as a Google Chromebook. In this ideal setup, every child would have individual access to the internet and learning materials preloaded on their device, eliminating the need for sharing equipment or commonly experienced disruptions when moving groups of students to a computer lab. This paves the way for a scenario where Jay believes he can effectively communicate with his learners using a microphone and his learners would wear headsets, ensuring that everyone can hear his instructions clearly without him needing to raise his voice. In this extract, we see evidence of an optimism that stems from a desire for a more personalised and controlled educational experience. Against the backdrop of classrooms that can become 'messy', 'busy' spaces filled with people, things and abstractions, Jay's wish is for technology to empower him to instil calm and focused learning.

Underlying Jay's vision for his ideal digitally-enhanced classroom, is an implicit understanding of the interconnectedness of the (im)material in the assemblage. In his scenario, Chromebooks become mediators of learning and a key material factor in shaping the kind of classroom environment that he would like to see as more personalised, yet controlled. Jay includes headphones and a microphone which, he believes, will improve his clarity of instruction and minimise learner distractions. In practice, these devices reconfigure the soundscape of the classroom by creating individual auditory 'bubbles' that would minimise learner social interaction and draw them towards the digital instead. Jay's vision also reveals an affective dimension. His desire for a *"perfect world"* where he *"would not have to scream"* suggests that classroom management is a source of frustration or stress for him. In this context, Jay believes that he can use the affordances of technology to achieve his pedagogical goals, because he understands that it has the ability to mediate interactions and to influence the affective atmosphere of the classroom.

In both interview extracts above, Vee and Jay display repertoires that are inextricably linked to their approaches to pedagogy and classroom management. The extracts also reveal contradictions as Vee and Jay struggle with the tension between agency and control within the classroom ecosystem. Both teachers speak about their commitment to creating a dynamic and engaging classroom environment in which technology is a mediating artefact. However, their reference to a classroom space that is *"calm and focused"* suggests that learner behaviour is a priority and that being *"dynamic and engaging"* is contingent. In the time that I spent observing and interacting with Vee and Jay, their expressed views about their pedagogical practices did not seem to hover far from more pressing concerns about the need to install a culture of discipline at the school by regulating learner behaviour.

In this context, the integration of digital technology into the classroom space is shaped by Vee and Jay's teaching approaches that are simultaneously constructivist and behaviourist in nature. Their repertoires reflect a dualism in which their leveraging of technology to encourage engagement and collaboration can coexist with their need to use it to maintain control and direct instruction. When Vee and Jay speak about using their multimodal resources to 'capture learners' attention', they are adding an understated layer to their classroom management strategies. Here, technology presents Vee and Jay with an additional tool that can be used to incentivise their learners to behave in ways that they deem appropriate for the classroom as a shared social space. In this way, technology becomes a mediating artefact in the power dynamics between teachers and learners and underscores the socio-material principle that material objects, such as digital devices, are not simply instruments but integral actors in shaping human actions and interactions (Gourlay, 2015).

How Vee and Jay think about, plan and carry out their lessons is not only influenced by their perception of the pedagogical affordances of technology, but also by their need to maintain a power dynamic within the classroom ecosystem that skews in their favour. As Selwyn et al (2016) argue, these moments where teachers find themselves in constant negotiation between the demands of the job and the available technological resources, shape the repertoire organically.

4.4.1 The ecology of the homeroom

> *When the two groups of 38 learners take up their seats in their homeroom, it is in spaces that, while neatly kept, show obvious signs of age. Much of the basic furniture has not been upgraded in years, especially the well-worn wooden flip-seat desks, which seat two learners. The wooden desks are not comfortable and begin to resemble metaphoric coffins😊 The space is confined and the presence of 38 young bodies gives it an over-crowded, claustrophobic feel. Digital technology is present in the form of a digital projector, a smartboard (dysfunctional), speakers, the teacher's laptop and smartphone. These resources are controlled by the teachers.* [Jay's classroom, Fieldnote #1, 120224]

Another component of the digital repertoire identified in Table 4.5, centers around the use of the classroom as a semiotic space. The above extract from my fieldnotes describes the environment present in Jay's classroom. The physical arrangement of the furniture adds a significant layer of constraint in determining Jay and Vee's teaching practices with technology. When the Grade 4 learners enter their homerooms, they are confronted by compact rows of desks which are arranged to face a whiteboard. This signals that the flow of the lesson will be teacher-led and that the potential interactions between the learners and content will be limited. The technology that is present in the form of a digital projector, speakers and laptops is controlled by the teachers and the learners do not physically interact with these devices. Nevertheless, the mere presence of these material objects produces an affective atmosphere (Thrift, 2008).

The following two extracts from my fieldnotes capture the social dynamics that unfold in Jay and Vee's respective homerooms when they integrate technology into their lessons. The first one details Vee's Natural Science lesson during which time she plays a series of video clips. The second features Jay teaching Maths while using a number of interconnected digital devices:

[Day 5: 20 February 2024 – 8 – 10.30am]

Vee starts off the day with a short admin session, during which time she uses her smartphone to record details about her class, such as absences and fundraising returns. This is a constant demand on her time as children return lists and cash money in little plastic bags. She has to document this and her phone is therefore constantly in her hand.

Vee powers up her laptop and data projector after 30 minutes. Her laptop window displays on the whiteboard and the children see her launch a YouTube video clip. The video buffers and she displays clear irritation at this, telling the class to 'be patient'. She pauses the video (no context is given) and continues to move around the classroom as before.

I can see that the children wait in eager anticipation, some almost willing it on to play. Their curiosity will not be met until they have finished the Maths exercise though. It has been over 20 minutes and the video is still on pause, frozen in time, calling out tantalisingly to the expectant children. While the children are engaged with the pen and paper task, Vee moves around the class (as is her practice), pausing when an intercom announcement suddenly breaks the moment and intrudes into the busyness of the learning space.

When Vee transitions her teaching to Natural Science, she draws the class's attention to the whiteboard and tells them that they are going to watch a video on 'Nature' and that they are specifically expected to focus on 'body covering' (Habitat adaptation). Once she presses play the learners are engrossed by the colourful 4 minute video which is narrated by an Australian naturalist. Once this video had ended, Vee played a second clip – this one being stored as a download on a laptop. It is entitled 'Natural Homes' and takes the viewer through a narrated slideshow of 10 slides showing both actual photographs and digital renditions of these spaces. The picture quality is poor and Vee expresses her frustration at not knowing how to 'adjust the video quality and sound'. The children do not seem to mind at all and continue to watch and listen attentively.

After the second clip ends, Vee then proceeds to engage the learners in a general Q and A involving both memory recall and thinking and reasoning questions. An example of memory recall questions which Vee asked: "What are some of the examples of body coverings on the animals you saw?" and "How does fur help animals that live in cold places?" A thinking and reasoning question which she asked: "How do body coverings help animals survive in their habitats?" and a reflective question: "What does this video teach us about adaptation?" The Q and A lasts for 5 minutes during which time (and judging from content responses), it is clear that the learners are more comfortable with memory recall questions, enthusiastically raising their hands answering these accurately. [Vee's classroom, Fieldnote #5.200224]

Figure 4.4.1a: Image of Vee's Natural Science lesson

[Day 2: 13 February 2024 – 8 – 10.30am]

Jay used the combination of laptop, data projector and microphone in his homeroom to engage the learners in a Maths lesson that focussed on Counting by Multiples. He played a series of YouTube clips in which the presenters would encourage the viewer to count mentally through multiples of 3, 5, 8 and so forth. It did not take long before the learners were responding out loud to the challenge to 'count by…'The 10 minute video session induced loads of energetic responses among the learners in what emerged as choral-based responses that increased in decibel level as the excitement grew. Jay actively moved around the class with his microphone, giving as many of the learners the opportunity to hear their voices through the Bluetooth speaker. He was able to generate and sustain the level of choral responses that seemed to grow louder as the learners' began to buy into the collective energy sweeping through the class.

The learners seemed visibly disappointed when he stopped the video clips with a number of moans and groans being verbalised. The majority then dug into their bags to remove their Maths textbooks, work books and stationery in preparation for the work which Jay had set for the period. He started by checking that his learners had completed their 'homework' – 5 Math sums from the textbook – before moving to the explanation and clarification part of the lesson. This he called 'corrections' and appears part of the expected routine. Based on the paired seating arrangement, it is easy for the learners to swap workbooks with a partner and for them to 'check' the accuracy of each other's work. I note the animation of the two learners who are seated in front of me, as they eagerly assist each other with the completion of the sums.
[Jay's classroom, Fieldnote #2.130224]

Figure 4.4.1b: Image of Jay's Maths lesson

In the first extract, we see that Vee's use of her smartphone to fulfil her administrative responsibilities appears as part of her daily routine. While it offers convenience, it also creates a constant demand on her attention, seemingly becoming enmeshed with the *"return lists"* and *"cash money in little plastic bags"* and potentially distracting her from her pedagogical duties at any moment. My reference to "*constantly in her hand"* reflects a visible attachment to her phone. I am reminded here of Jay's reference to technology as an *'extension'* of himself. When Vee powers up her laptop and launches a YouTube video clip, it displays on the screen and immediately draws her learners' attention, which is her stated intention as mentioned previously in 4.4. By pausing the video, her learners shift from a state of *"eager anticipation"* to that of being *"patient"* while being required to complete a paper-based Maths task. When Vee eventually plays the video, it indicates to her learners that the next period has begun. As they watch the screen, I note that they are attentive and *"engrossed"*. After the series of nature-related video clips were played, Vee then continued to engage the class through a number of questions posed verbally. The learners seemed enthusiastic and, judging from the raised hands, showed more confidence in their ability to respond to the memory recall questions. However, they showed less confidence in answering the higher order question that required them to reflect on the actual purpose of the videos and to state what they thought they had learned from them.

Applying Mortimer and Scott's (2003) communicative framework for describing the dialogic potential of classroom talk, the extract suggests a teacher-dominated social plane. Vee controls the resources (laptop, projector, video selection) and dictates the lesson's flow. Her learners primarily react to her cues. Vee's main lesson aim seems to be to provide information about animal habitats and adaptations. This is evident in her use of videos and the subsequent Q&A focused on content recall. The Initiate-Response-Feedback (IRF) pattern (Mortimer and Scott, 2006) that unfolds sees Vee leaning towards authoritative discourse, while her learners are somewhat interactive when they respond to her questions. She instructs, controls pacing (delayed video, transition cues), and asks questions with specific answers in mind based on memory recall. Although she includes a thinking/reasoning question, the observation about learners being more comfortable with recall suggests the thinking/reasoning mode is less emphasised. There is no mention of learner-led discussions or pair/group work. The paused video, sparking learner curiosity, created a moment which Vee could have used to prompt open-ended questions, predictions, and learner-led exploration, potentially signalling a shift in the dynamic towards a more dialogic approach. As Mortimer and Scott (2006) argue

> a necessary tension therefore exists between authoritative and dialogic approaches as dialogic exchanges are followed by authoritative interventions and the authoritative introduction of new ideas is followed by the opportunity for dialogic application and exploration of those ideas (Mortimer and Scott, 2006: 90).

Jay's use of technology follows a similar pattern as the one taken by Vee. His Maths lesson focuses on practising counting by multiples and is introduced by a series of YouTube video clips projected via laptop and data projector onto a screen. The video's soundtrack, played through a Bluetooth speaker, produces energised choral responses from his learners which are amplified when Jay introduces a microphone. After 10 minutes of *'Counting by Multiples'*, he shuts off the video and instructs them to take out their Maths homework for correction checking. This produces audible groans of disappointment amongst the learners who reluctantly swap workbooks with their partners sitting next to them, but continue with the checking nonetheless.

Jay's lesson combines elements of teacher-directed instruction with learner engagement and interaction opportunities. He controls the flow of the lesson, including the video session and the initial homework check. While authoritative discourse patterns are visible in the second extract, Jay makes an effort to encourage his learners to participate in various ways. For example,

instead of sitting quietly while watching a video clip, Jay's learners are able to count out aloud as it plays. They are also able to assist each other during the paired work on corrections. However, the observable IRF pattern of authoritative/interactive (Mortimer and Scott, 2006) is determined largely by the nature of Mathematics' discourse with its emphasis on established procedures and solutions. Through his use of technology blended with choral responses and his animated movement around the class, Jay is able to create an atmosphere in his classroom that is conducive to peer learning and collaboration.

In both ecosystems described above, the teacher leads from the front, maintaining control over the flow of the lesson including the transition between digital and paper-based activities. Vee and Jay's homerooms are structured, ordered spaces. The fixed seating arrangement limits learner movement and hence social interaction. Both lessons were time-managed and featured the use of digital resources strategically introduced at the start in order to draw the learners' attention. The interactions that do occur between the teachers and their learners are mainly verbal, face-to-face interactions and are characterised by the prevalence of an authoritative discourse. The integration of digital tools in both instances, is aimed mainly at the consumption of information rather than as integral tools for investigation or creation. Although the introduction of a microphone raises levels of interest and enthusiasm amongst learners, their choral responses do not indicate that they have actively grasped the concept being taught nor does it give any insight into the sustainability of this type of engagement beyond the initial excitement of the video.

The homeroom's material limitations stymie the kinds of digital integration practices that Jay and Vee would prefer to harness. In this space, technology ends up supporting transmission teaching rather than facilitating a more progressive pedagogy. Where the teachers use IRF patterns primarily for recall questions, literacy practices seem to be focused on retrieving and demonstrating existing knowledge rather than constructing new understandings or engaging in extended written communication. The emphasis on teacher-led information transmission and controlled learner responses appear to limit opportunities for learners to actively use language to construct their own ideas, arguments, or interpretations in written form. In the time spent observing Vee and Jay in their homerooms and as it also appeared in the IT Lab, I did not see any instances where their learners were engaged in reading or producing original texts based on the digital prompts. Their literacy practices are primarily channelled through listening and speaking, with a heavy emphasis on receptive understanding and accurate recall.

4.4.2 The IT Lab as a distinct ecosystem

In comparison to the homeroom, the IT Lab at the school offers Jay and Vee a different set of constraints and affordances to contend with. As it stands, this space contains 20 mini-pc desktop computers, 15 of which are fully functional and have internet access. The 5 dysfunctional computers cannot be fixed and require replacement. The school does not have a budget for this.

The following photograph captures the set up of the IT Lab: [Photo #4, 130224]

Figure 4.4.2a: The school's IT Lab

The following extracts are taken directly from my field notes which aim to describe the complexity of the IT Lab as a distinct ecosystem:

[Day 1: 12 February 2024: 8 – 10.30am]

Judging from the increased level of chatter and the animated moving of bodies as they enter the lab, it is clear that the children are excited about the prospect of using the computers, although this is somewhat stymied for some learners who experienced problems logging on to the workstations. Jay is able to assist these learners in a reassuring manner. Shifting his focus to the lesson, Jay gives the learners the instruction to 'click' on a pre-installed software programme called Mathemagics. This programme encourages users to solve various Maths-based tasks and allows for a 'levelling up' if the user is successful. The learners spend 20 minutes engaged in what is essentially a 'mental maths' exercise as they practise Rounding off of numbers..

During this time, I observed that the grouped learners were working collaboratively, not only assisting each other with solutions, but also in the way in which they were able to navigate their way around the programme. The action of clicking the mouse and entering information via a keyboard, was often negotiated and shared amongst the learners. I noted that the learners displayed functional computer-based repertoires.

At 8.45am, Jay gave the instruction for the learners to 'push away the keyboards' and to refocus their attention on their textbooks and workbooks. He used the whiteboard, explaining how he wanted them to complete the exercise on The Rounding off of Whole Numbers as presented in the textbook. While most of the learners shifted their attention to their workbooks, some remained distracted by the computer (screen, mouse, keyboard), continuously clicking away and fidgeting with various objects of interest surrounding them. Jay moved around the class, providing assistance where needed. In a situation where one group had gone off task by watching a YouTube clip on an 'egg in the bottle experiment' (Nat Geo Kids), Jay gently, yet firmly, addressed this, reminding the learners of their responsibilities and that the WCED is 'monitoring their internet behaviour'. [Jay in the IT Lab, Fieldnote #4.190224]

[Day 3: 22 February 2024: 8 – 10.30am]

Vee has taken her class to the IT Lab. Here, the learners are engaged with a computer-based task in which they are required to click their way through a number of YouTube clips on 'Expanded notation' in Maths. Vee instructed the learners to 'make notes' based on what they viewed. The learners share the 15 operational computers and the choice of video clip to watch is usually preceded by a short discussion. One learner in each group adopts the role of 'clicker'. For the audio to be heard, the two headphones are held out rather than worn by anyone in the group. The videos are selected at random after Vee indicates that a Google search using the keywords 'Expanded notation' would result in a positive outcome.

Different groups use similar strategies to write down what is identified as important information. At least one person takes on this responsibility and shares it with the others at the end of each video clip watched. While there is no explicit teaching of any soft-skills, Vee assists the groups in their search and in the way in which they consume the content. The learners are engaged, although it is difficult for me to gauge accurately the level of concept understanding taking place. Working collaboratively certainly has its affordances as the learners are able to help each other in trouble-shooting their way through the process. For some, it appears that the video clips hold pedagogic value. I am impressed when one of the learners (with whom I have struck up a dialogue of sorts), makes his way over to me, and beaming with great confidence says: "I know how to do it now!" He then places his notebook next to me and shows me how his new-found knowledge helps him to solve the five sums which his teacher has set the class at the beginning of the session.

Vee switches the class's attention to the whiteboard to explain, clarify and illustrate to the class how they could go about solving the sums (subtraction). The children work diligently; generally they appear confident with their ability to complete the task successfully. While the learners are watching the youtube clips (essentially consuming content), other roles become evident in the IT Lab that are not possible to duplicate in the homeroom.

With ten minutes of the lesson to spare, Vee gives the learners permission to search the internet for anything of 'educational interest' to them. When I asked her about this aspect, Vee indicated that she uses this unstructured practice as an incentive (to be read as positive reinforcement). Topics of interest that I observed being selected on YouTube included Fun Science experiments, Wild Life, Famous Sporting moments and Arts and Craft. [Vee in the IT Lab, Fieldnote #4.190224]

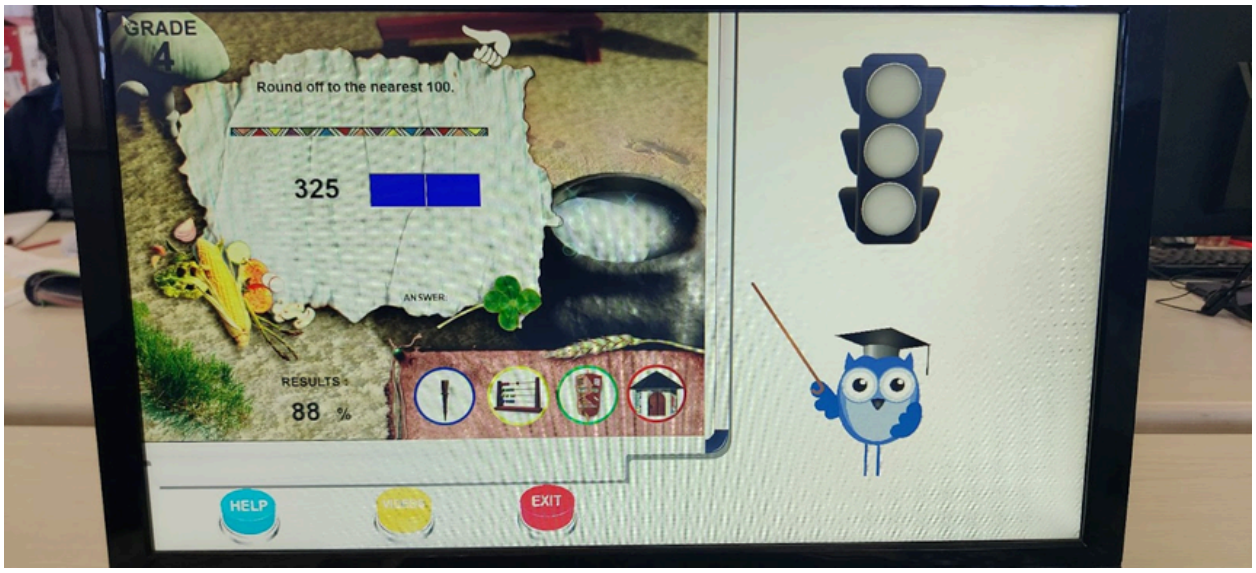


Figure 4.4.2b: Image of *Mathemagics* interface

The addition of computers amplifies the dynamic nature of the learning space, invariably making it more complex to analyse. However, the limited number of functioning computers shifted the assemblage, altering how learners interacted with the technology and how they engaged with each other and the content. With three to four learners clustered around each computer, I observed how each group was able to negotiate the different roles for each learner that would in practice facilitate the completion of the set tasks - "*The action of clicking the mouse and entering information via a keyboard, was often negotiated and shared amongst the learners."*

Figure 4.4.2c: Image of the IT Lab as an assemblage

In this way the assemblage concept allows for a fluid perspective where the arrangement of parts can lead to emergent, and often unpredictable, outcomes. Despite the raised levels of enthusiasm that came with their sense of anticipation, it became clear that some learners had become anxious while using the resources under their peers' watchful eyes. For them, enforced sharing seemed to impede their individual learning expressions and the opportunity to delve deeply into the digital material at their own pace.

The affective dimensions of the IT Lab are significant. I have drawn on the theory of affect (Burnett and Merchant, 2020) in my research to capture the range of emotions and subjective experiences that animate an assemblage. For instance, the excitement that learners show at the prospect of using the computers introduces an affective charge that can either facilitate or hinder learning. It is an emotional investment that gives life to the machines and software, turning them from inanimate objects into vital components of the educational process. The learners' responses to technology give it value and power, influencing how they process information and the degree to which they are able to work together. However, emotional responses carry with them an unpredictability that can run counter to lesson objectives. For example, in the first extract, Jay has to contend with a group of learners who have *"gone off task by watching a YouTube clip on an egg in the bottle experiment".* While the science-based content gripped the interest of the learners, Jay's concerns were less about the appropriateness of video and more about the undermining of his authority which they had shown by going off task.

In the second extract, Vee in contrast to Jay, gives her learners explicit permission to *"search the internet for anything of educational interest"*. This moment occurs towards the end of her Maths lesson and Vee's learners seemed to follow her instruction with high enthusiasm, eagerly clicking around for topics of interest to watch. She actively uses the lure of the internet here to keep her class engaged (or distracted?) potentially allowing her the time and space to regroup and to tackle other administrative tasks. Vee explains that rewarding her learners for their productive work and good behaviour with internet time, is part of her classroom management strategy when in the IT Lab.

Internet access primarily defines the IT Lab as an attention-grabbing digital learning space. However, my field notes reveal that contradictions and tensions arise from the way in which Jay and Vee insert the internet into lessons, especially in relation to the way in which this impacts on their learners' literacy practices. Both teachers struggle with the dual effects of the internet and the contradictions it poses. While it allows for the stimulation of learner curiosity and autonomous learning as a desired outcome, it simultaneously exposes them to material that may not be educationally appropriate or productive. This tension reflects a broader educational debate regarding the boundaries and guidance necessary in digital exploration within the school setting. For Jay and Vee though, the challenge in leveraging the affordances of the internet, is to ensure that all online material is curated and reflected in a structured lesson plan. In doing so, they understand the importance of keeping their learners engaged through technology in meaningful ways. Mitigating the potentially harmful impact of any unintended consequences and equally the unpredictable nature of learners' affective responses to digital stimuli, emerges as a priority for Jay and Vee.

In both extracts, literacy practices in the IT Lab initially appear collaborative. For example, when the learners interact with *"Mathemagics"* during Jay's lesson, how they engage with and interpret the virtual content is not determined by the software itself. (Im)material factors such as their prior knowledge, the software design, social interactions, the learning objective and the classroom environment play important roles in shaping how meaning-making occurs. As I note:

> *During this time, I observed that the grouped learners were working collaboratively, not only assisting each other with solutions, but also in the way in which they were able to navigate their way around the programme. The action of clicking the mouse and entering information via a keyboard, was often negotiated and shared amongst the learners.*

When Jay instructs the learners to *"push away the keyboards"* and to focus on their Maths workbooks, it signals a shift in modality and embodied experience. The learners are required to change their cognitive processes, physical actions and social interactions from a dynamic, multimodal, and often collaborative digital space to a more individual, linear, and print-based one. Jay's instruction is coupled with a reminder about 'internet monitoring' and marks a return to control over his learners' actions and engagement. This shift in literacy practices however, appears to generate some tension. My observation that a few learners remain distracted by the computers after being directed back to textbooks: "*some remained distracted by the computer… continuously clicking away and fidgeting with various objects of interest",* points to a disconnect between digital and analogue activities for them. It is perhaps understandable that for these learners, the engaging nature of the computer-based activity overshadows the prospect of print-based activities that are perceived to be 'dull' and 'boring'.

Jay appears comfortable with both learning modalities and is able to manage the transition between digital and analogue activities with a discernible level of confidence. That said, I noted that Jay seems to have missed an opportunity here to connect the *"mental maths"* practised during the computer activity to the concepts presented in the textbook, which could have helped to deepen his learners' understanding.

When Vee's learners click their way through a series of YouTube clips on *"Expanded notation"* in the second extract, literacy becomes positioned as digital consumption. Vee provides specific keywords for searching, directing her learners towards pre-selected educational videos. They work together in small groups collectively deciphering and recording key information relating to the topic. The learner who confidently explains his understanding *"I know how to do it now!"* (Day 3 extract), and demonstrates his ability to solve maths problems, shows how consuming digital content can translate into active knowledge construction.

Videos combine visual, auditory, and textual elements, creating a complex interplay of meaning-making modes. Learners engage with literacy not just through decoding text, but also through interpreting images, sounds, and the relationships between these elements. The purpose for watching a video shapes how learners engage with it. A learner watching a video for entertainment may engage with it differently than a student watching a video for educational purposes. The context of viewing, such as whether it's in a classroom setting or at home, also

influences how learners interact with the video. Unlike static text, videos unfold over time. Learners can pause, rewind, and fast-forward, controlling the pace and sequence of information intake. This dynamic interaction allows for a more personalized and self-directed learning experience.

However, I observed that Jay and Vee stopped short of setting their learners the kinds of text production activities that would allow them to apply the knowledge gained from watching the video clips. From a literacy perspective, the absence of text production in the IT Lab restricts the development of the kinds of deeper literacy skills that have become essential for the digital age. While learners may still engage in reading and interpreting information presented in the videos, they miss out on the opportunity to develop their writing skills, which are crucial for expressing ideas, constructing arguments, and engaging in critical analysis. The multimodal nature of video content, while engaging, can also present challenges for learners who may struggle to discern key information and synthesise complex ideas presented across different modes (visual, auditory, textual).

Two additional concerns arise here: The first concern is that the consumption-based use of the internet reinforces a more passive mode of learning, where learners are recipients of information rather than constructors of knowledge, actively exploring, creating and sharing new ideas. In this situation, the videos, rather than the teacher, become the primary source of information transmission and the communicative approach leans towards the authoritative mode.
The second concern holds that the multiple small screens in the IT Lab simply become a substitute for the big whiteboard screen in the homeroom in capturing learners' attention. These concerns are consistent with Prinsloo's (2006) findings that the integration of technology in the classroom might simply reinforce traditional, non-digital teaching and learning practices.

4.5 Components of the digital repertoire - tabulating the data

The following table synthesises data from classroom observations, teacher diaries and interviews offering a comparative overview of the key components of Jay and Vee's digital repertoires. I have organised and tabulated these according to: access to digital resources; skills and proficiencies with digital tools and platforms; pedagogical approaches; beliefs and attitudes towards and prior experiences with digital technology; classroom spaces; social identities and institutional support.

Jay and Vee's individual approaches and the shared contextual factors that influence their technology integration practices are contrasted here. The components of the repertoire are not isolated from each other but should be seen as interconnected and shaped by the specific environment in which Jay and Vee work (Selwyn et al 2016). The table contains descriptions of how their repertoires are expressed as the teachers draw on available semiotic resources:

Components	Jay	Vee
Access to Digital Resources	- Has limited access - relies on the school's resources and free tools	- Has limited access - relies on the school's resources and free tools
Skills and Proficiencies	- Digital mindset: comfortable with technology - actively engages with technology in online/offline spaces - proficient with basic digital tools such as laptop, data projector, smartphone and education-based apps in teaching practice and administrative tasks - draws extensively on YouTube and AI platforms for lesson planning - uses WhatsApp to communicate with parents - is able to adapt to existing constraints on use of technology by returning to non-digital pedagogies	- Digital mindset: fairly comfortable with technology - navigates between digital resources like her smartphone, laptop, data projector, educational software and apps - favours slideshow presentations and video clips - attends ICT training courses when possible - struggles to implement course-based ideas practically - uses WhatsApp to communicate with parents - is able to adapt to existing constraints on use of technology by returning to non-digital pedagogies
Pedagogical Approaches	- Aims to create a learning environment that is collaborative - combines elements of teacher-directed instruction with learner engagement and interaction opportunities. - leverages technology for classroom management purposes to maintain control and direct instruction. - favours an authoritative discourse - follows both a constructivist and a behaviourist approach	- Integrates technology for deeper learning - uses it to capture and hold learners' attention, providing her with a sense of control - defaults to authoritative discourse practices - controls the transition between digital and paper-based activities - leverages technology for classroom management purposes to maintain control and direct instruction.
Beliefs and Attitudes about Technology	- Enthusiastically embraces the affordances of technology - it is a tool that can enhance literacy and learning; it has tangible value - it is an extension of his cognitive abilities.	- It is a tool that can enhance literacy and learning. - multimodal affordances make her lessons more dynamic and interesting - it can have a positive impact on the mindset of learners.

	- experiences technology as tension - It blurs the boundaries between work and personal time - He feels as if he is 'always on'	- integrates social values into the practical use, management and care of shared material resources. - concerned that her professional identity, personal space and privacy is being compromised.
Classroom Spaces	- his homeroom is a hybrid space: combines physical, digital and social resources (an assemblage) - seating arrangements are fixed - engages with digital technologies alongside traditional print materials - the IT Lab is used for app-based activities and video-based learning - it allows for learner-centered pedagogies that go beyond passive consumption	- her homeroom is a hybrid space: combines various semiotic resources (an assemblage) - digital tools take on multiple roles and meanings depending on the context (such as her smartphone) - ordered with fixed seating arrangements - The IT Lab is used for app-based activities and video-based learning - It allows for learner-centered pedagogies that go beyond passive consumption
Social Identities and Institutional Support	- Limited resources, working class community - Fills the role of 'IT champion'; impacts decisions - Struggles with this positionality; contradictions that arise between his perceived professional responsibilities and the social expectations of colleagues and parents; - receives little institutional support	- Limited resources, working class community - fills the role of pastoral care-giver - receives little institutional support

Table 4.5.1 - Components of Jay and Vee's digital repertoire

4.6 Conclusion

This chapter has explored the digital repertoires of Jay and Vee, addressing Research Question 1 by identifying and exploring the key components of their emerging digital repertoires. Using a data table and nested circles model, I have analysed how the classroom ecosystem impacts the individual teacher. The components table details specific skills, practices, beliefs, and access levels, offering a granular view of each teacher's digital repertoire. The nested circles model reveals how these individual components are shaped by the broader classroom context. For example, limited access to technology, as noted in the components table, directly impacts a teacher's ability to integrate technology effectively, regardless of individual skills or beliefs. This interplay between individual factors and the classroom environment addresses Research Question 2, examining how the affordances and constraints of technologies and the school

environment influence the development and enactment of digital repertoires. As demonstrated in this chapter, Jay and Vee’s digital repertoires unfold within the distinct ecosystems of the homeroom and the IT Lab, each influencing and influenced by the resources, interactions, literacy practices and pedagogical approaches employed within those spaces. Their repertoires are sensitive to the affordances and constraints of these hybrid spaces, constantly adapting to the available resources and established routines. A critical challenge they face is ensuring that access to technology translates into enhanced literacy learning, particularly the development of deeper literacy skills such as critical analysis, creative composition and effective communication. Furthermore, their digital repertoires are intertwined with classroom management strategies, reflecting their positionality and the power dynamics within the classroom. This highlights the dynamic and situated nature of the digital repertoire, shaped by individual agency, socio-material context and the teacher's positionality within the classroom ecosystem. The next chapter will broaden the scope of analysis to encompass the school domain and the outer circles of influence, exploring how school policies, resource allocation, and broader societal factors further shape the development and enactment of teachers' digital repertoires.

Chapter 5: Exploring the digital repertoire in its broader context

5.1 Introduction

Chapter 4 explored the individual digital repertoires of Jay and Vee, utilizing the components in table 4.5.1 to identify their skills, practices, beliefs, and access levels regarding technology integration within their classrooms and employing the nested circles model to understand how the classroom ecosystem shaped these repertoires. This analysis revealed the dynamic interplay between individual agency and contextual factors, laying the groundwork for addressing Research Question 3: In what way do broader institutional factors influence the digital repertoire of teachers as they attempt to integrate digital technology into their teaching practice? Answering this research question will entail examining several key areas: firstly, the impact of school-level policies on technology adoption and use; secondly, the role of resource allocation and infrastructure in supporting or hindering technology integration; thirdly, the influence of school leadership and professional development opportunities on teachers' digital literacy skills and pedagogical approaches; and finally, the broader societal and cultural factors that shape teachers' beliefs and attitudes towards technology in education.

Chapter 5 expands the scope of analysis to encompass the wider school context, exploring how these institutional factors interact with individual teacher characteristics and classroom dynamics to shape technology integration and, consequently, teachers' digital repertoires. By examining these broader contextual layers, we aim to gain a more comprehensive understanding of the complex interplay of factors that influence technology use in resource-constrained environments and its effects on teachers' professional growth and pedagogical practices. This approach is consistent with the work of Selwyn et al (2016) who argue that digital repertoires are not developed in isolation but are shaped by the specific environment in which teachers work.

5.2 Working in a resource-constrained environment

The data table 4.5.1 places ‘access to resources’ as a primary component of Jay and Vee’s digital repertoires and describes it as ‘limited’ even though they use the resources provided by the school (laptops and data projectors) and draw on free tools when able. The availability of digital tools and infrastructure to the individual teacher (level 1) is influenced by the school’s

socio-material positionality within a working class community on the Cape Flats. The following vignette adapted from my field notes provides detail as to what this 'looks' and 'feels' like in real terms:

Teachers Jay and Vee teach Grade 4 children at a single medium, English co-ed primary school situated in a working class community on the Cape Flats. The school has a distinctive Catholic influence that mirrors its historic and material connection to the Church. During the Apartheid years, it catered for children from the surrounding 'Coloured' community and garnered a healthy reputation for providing a 'good education'. Since the arrival of democracy in 1994, the school's racial profile has steadily shifted with the increase in the number of children drawn from historically Black townships and from Black families who had moved into the area. The perception of the school as a source of 'good education' at an 'affordable price' attracted attention. A number of compromises were made by Black families, including parental concerns about a mismatch between the school's language of learning and teaching and their children's home language.

As it stands today, at least 60% of the children who attend the primary school identify as Black African, the majority of whom speak isiXhosa as their home language and are learning English at school. It is significant to note that this trend is not reflected in the teachers who are employed at the school. Of the 17 teachers paid by the Western Cape Education Department (WCED), only 2 are Black African, while the majority are [1] Coloured teachers who are predominantly English speakers with Afrikaans as an additional language. The learners are taught through the medium of English, follow English as a Home Language curriculum and are expected to learn Afrikaans as a subject (First Additional Language). IsiXhosa does not appear in the curriculum.

The school simply does not have the financial resources to afford School Governing Body (SGB)-paid teachers, let alone to expand its curriculum towards the digital. An indicator of the school's socio-material position is contained in the significant statistic that 75% of the learners who attend the school, are recipients of the state's feeding scheme programme, i.e. they receive something to eat at the start of each school day.

When it comes to the school's digital footprint, social and material factors understandably play an important role in shaping these dimensions, which in turn shapes the kinds of digital literacy practices that exist in the classroom. The WCED provides the school with free internet access through its 3g broadband platform. This often makes access to the internet an erratic experience for the staff who, as I observed, often complain about poor connectivity. This situation is worsened when load-shedding (nationally scheduled electricity cuts where power is switched off for 2-4 hours depending on the level of load-shedding) occurs. The school cannot afford the installation of the kinds of add-on technologies that are able to provide a continuous power supply in the form of inverters. This means that it is completely offline for the duration of the load-shed. [Fieldnote #1.130224]

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[1] Under Apartheid, the term "Coloured" was a legally defined racial classification. It encompassed people of mixed European, African, and Asian ancestry, primarily those of mixed European and Khoisan descent.

5.2.1 A socio-material view

A socio-material analysis of the descriptive vignette above, using assemblage theory, reveals a complex interplay of human and non-human elements shaping the school's educational landscape. Its historical legacy, demographic shifts and socioeconomic context intersect with its funding model, lease agreement and Quintile 3 status. This intersection creates a complex financial situation in which the school is under continuous pressure to balance fee collection with increasing fee exemption needs. The situation is exacerbated by poverty as is evident in the high number of students relying on the feeding scheme. All of these factors are not merely felt as financial constraints. They are integral parts of the assemblage, actively shaping the availability of digital resources and professional development and simultaneously limiting the scope of teachers' digital repertoires.

The tension between maintaining the school's reputation and serving a diverse student body with limited resources further complicates the assemblage, creating constraints on how teachers can incorporate digital tools. Teachers' attempts to incorporate digital tools are thus constrained by these broader institutional factors, hindering the development of robust digital literacy practices and potentially entrenching existing inequalities. Within the nested circles model, the institutional level acts as a powerful systemic force shaping not only *what* digital tools are available but also *how* teachers can utilize them, ultimately defining the boundaries of their digital repertoire. These constraints prevent desirable learning experiences, limiting teachers' exploratory work and learners' creative 'play' with digital tools that are lively, fluid and emergent (Burnett and Merchant, 2019: 47).

The potential for inquiry-based learning, where learners actively construct knowledge through experimentation and collaboration, diminishes. This stymies the creation of an "active designer of meaning" (Cope and Kalantzis, 2006:10) and reinforces a cycle of limited repertoires and restricted learning experiences.

5.2.2 Using limited digital resources

As a primary school situated within a working class community, the vulnerabilities associated with poverty such as gangsterism, child abuse and gender-based violence, impact significantly on the concerns of the teaching staff. The school has a strong commitment to pastoral care and regards the safety of its learners as its priority. This function is explicitly stated in a document called the 'Staff Vision Statement', a copy of which is displayed in each classroom (see Figure

5.2.2). #3 specifies that staff will aim to guide learners in a *"safe and secure environment, where teaching and learning can take place"* and strive towards *"quality education"*. The set of rules and expectations that regulate both teacher and learner conduct have, over time, resulted in the solidifying of a strict culture of discipline that also extends to the frugal way in which decisions are made about the purchase and use of material resources.

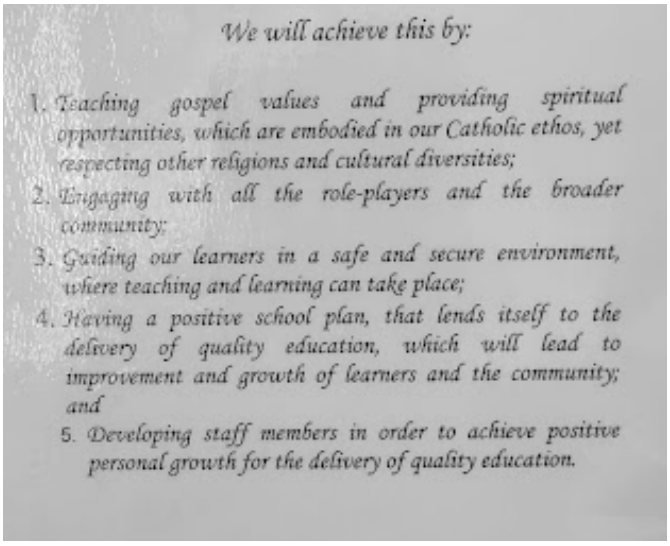

Figure 5.2.2: Poster Image of Staff Vision Statement

The Staff Vision Statement displays commitment towards creating safe spaces for learners and is an illustration of how the school's culture and climate (level 3) influences Jay and Vee's classroom management styles and their interpretation of what constitutes effective pedagogic practice. The way in which learners interact, learn, and engage with each other and the material present in the homeroom, is shaped by a discourse of control embedded within concerns about a wide range of learner safety issues, including the digital. For example, Vee's response to my question about the safe and responsible use of technology, was framed within her understanding of the 'safe space' and not within broader, abstract concerns about ethics and privacy:

> *"Ja certain values. uhm like. take responsibility for certain things (↑) you know.. they are not allowed maybe to [sighs]… [quickens pace] just to be careful and be responsible when handling other people's things (↑) because these things that we are handling is not our own, you know…"* [Vee, Interview, #46: 050424]

What Vee is expressing here is her belief that it is important to integrate social values into the practical use, management and care of shared material resources. She believes that it is important for her to foster an environment where values such as responsibility and care are not

only taught verbally but are also enacted and learned through the careful handling of material objects within a shared space This reveals a key tension that exists between encouraging learners to engage with digital tools and the reality of a school that cannot easily afford to expand on or to replace scarce resources.

5.2.3 The impact of load-shedding on technology-dependent teaching

The vignette references the phenomenon of *load-shedding* as 'worsening the situation'. Load-shedding acts as a significant practical barrier, disrupting access to digital resources and making it difficult for teachers such as Jay and Vee to plan and implement technology-dependent activities. It is important to gain a sense of how scheduled electricity cuts, or load-shedding, impacts on the school's already limited digital experience. In the three weeks I spent engaged in fieldwork there, load-shedding occurred daily, leaving the school without power for at least two hours per day. The school's entire digital network stops and the teaching, learning and administrative function of the school is significantly impacted. A classroom moment from my fieldnotes involving teacher Jay serves as an illustration of what this disruption in the planning and flow of a typical lesson looked like:

Day 1: 12 February 2024 – 8 – 10.30am
On my first day of classroom observation, Jay informed me that he would be pushed for time to complete his English lesson which was time-tabled from 9.30 to 10am. This was a consequence of an expected 10am load-shed, which he was able to confirm via his app, Eskomsepush. The lesson was based on a listening comprehension entitled 'The Lion And the Mouse'. During the lesson, Jay used various digital resources to draw the attention of the learners. His use of a slideshow to explain the basic elements of a story, coupled with his use of a microphone connected via his laptop to a Bluetooth speaker, made the process of reading the story out loud, an engaging experience for the learners.

Those who had volunteered to read the text displayed on the screen, did so with some excitement drawing pleasure at hearing their voices amplified. The second part of the lesson involved a discussion and then a Q and A as Jay sought to establish the level of understanding amongst the learners. After glancing at his smartphone a few times, he sped up the Q and A activity. However, by 10am load-shedding kicked in, abruptly shutting off the data projector and the microphone, much to the general dismay of the learners, whose groans reverberated around the classroom. When Jay instructed them to complete the answers to the story's comprehension-type questions in their workbooks, the groans continued for a little while longer... [Fieldnote #1.120224]

When viewed through a socio-material lens, this extract reflects what Toohey & Dagenais (2015) refer to as an “intricate liaison” (Toohey & Dagenais, 2015 :312), a complex interplay between Jay, his learners, the curriculum and various hardware and software technologies, i.e. his smartphone, apps, laptop, projector, microphone, speaker and the electricity supply. These elements are entangled and shape the look and feel of the lesson. The theory of assemblage holds that while inanimate, the technologies exert a form of agency (understood as power). *EskomsePush*, the load-shedding app which provides daily timetables for electricity cuts, dictates the lesson's time frame. The extract shows that the information which Jay receives from the app places him under pressure to adapt his plans to accommodate for the inevitable moment when load-shedding occurs and the devices power off. We see this when he accelerates the Q and A session.

In the interim, Jay is productive and is able to leverage some of the affordances of digital technology to create as engaging a learning environment as possible. The learners’ responses are influenced by the technology; they show visible pleasure at their amplified voices and the interactive nature of the digital tools. When the power goes out, the lesson is effectively disrupted which evokes clear frustration and disappointment for Jay and his learners. This moment relates to Gourlay’s (2015) research into learner engagement with technologies where such technologies are seen to modify user actions and create feedback loops that shape affect and behaviour. Their groans signify their understanding of a shift in the lesson’s value and expectations, suggesting a potential disconnect between the perceived value of technology-mediated learning and more traditional methods. Although the materiality of the workbooks offers a fallback for Jay who is trying to be resourceful, it is predictably viewed as less engaging by the learners.

This extract reveals the vulnerabilities of technology-dependent teaching. In the context of the school, these vulnerabilities are amplified by the reality of load-shedding as it exposes the limitations of its tech capabilities. Load-shedding as a phenomenon highlights the interdependence between the social (teaching methods, lesson planning, educational experiences) and the material (tech devices, electricity). Jay’s lesson reveals what happens when disruptions in the material infrastructure reverberate through the social structures of his classroom. It shapes the classroom dynamics, produces affective responses and influences both the teacher’s and the learners’ interactions and experiences (Gourlay, 2015).

The tension that emerges from the relationship between teachers and technology due to the instability of the material infrastructure, is also mirrored in Vee's experiences. Here, I draw on an extract from my interview in which she speaks about the impact of load-shedding on her planning in response to my question about the challenges which she faces when looking to integrate technology into her lessons:

> *"well load shedding [all laugh] is a major.. plays a major role uhm.. when I set up a lesson.. when I have this.. look [quickens pace] I'm going to put this lesson up on the internet but load shedding happens (↑) I have to revert back to the textbook or I have to make copies or whatever the case.. so I have to revert back because then I can't, or the other thing I have to wait for load shedding to.. to be over [quickens pace] and then I need to go back to what I originally wanted to play for the learners (↓).. so it delays load shedding delays the process of teaching maybe (↑) and uhm the plan for the day. It..it.. it delays my plan for the day and my teaching at that point//"* [Interview, #15: 050424]

My *[all laugh]* joint laughter reference is evidence of a shared familiarity with a reality that confronts all South Africans - the scourge of load-shedding.☠️ Vee's repetition of the word *major* echoes this sentiment and reveals what the scale of the disruption caused by the power outages signifies to her. She says that it acutely affects all aspects of her teaching, including lesson planning and preparation. Any lesson that depends on digital tools and internet access is scuppered and she has to switch to contingency plans like using a textbook or making copies of materials. Interestingly, Vee's repeated reference to *revert back* suggests that she is comfortable enough to return to traditional or non-digital pedagogies in which paper-based learning is positioned at its centre. This sentiment also places traditional pedagogies in the past.

She emphasises that such power outages cause delays in her teaching schedule, interrupting the planned activities and forcing her to adapt until power is restored. Her frustration is palpable as reflected in her rise in intonation here - *but load-shedding happens (↑)* and is an affected response that stems from a socio-material situation over which she has no control.
As with Jay, load-shedding presents a stark counterpoint to her digital aspirations and challenges her ability to leverage the affordances of digital tools. This extract from my interview also reveals that Vee shows resilience and flexibility in responding to the pressure to adapt lesson plans and teaching methods. In navigating the disruptions caused by load-shedding, I found that both Vee and Jay consciously transitioned from high-tech to low-tech or no-tech teaching methods. The data extracts which I have selected for analysis here, both illustrate a necessary component of the digital repertoire, i.e the ability to be flexible, to adapt and to develop contingency plans is essential when relying on digital resources. While load-shedding

amplifies the fragility of the school's limited material infrastructure in this instance, it also serves as a reminder that:

> an assemblage has room for tension, mismatch and ongoing reconfiguration. There is not a sense of creating and then maintaining a balanced symbiosis of parts. As a result of this heterogeneity and independence, assemblages dismantle and reassemble in different combinations as context and requirements shift (Carrington, 2013 cited in Sefton-Green et al, 2016: 19).

5.3 The lack of an ICT policy complicates digital practices

The broader institutional context is also impacted by the lack of an ICT policy that makes it more difficult for Jay and Vee to navigate their way around the constraints experienced at individual and classroom-level. From what I observed and then noted in my fieldnotes, Jay and Vee's digital repertoires are characterised by a reliance on the affordances of their laptops and smartphones. They have unrestricted use of the laptops during the day, but are not allowed to take them home since they are owned by the school. This is a limitation for Jay and Vee as they then have to work on their own personal laptops outside of school. To overcome this, they use cloud storage via Google Drive which enables them to access their synchronised digital resources when using the school's laptop.

Their smartphones play a significant role in their daily administration practices and are therefore always within reach. I observed that Jay stores his smartphone in his rear pants' pocket, while Vee places hers on her table for ease of access. Both teachers have their notification sounds switched off, while enabling the vibration function instead. Typically at the start of the school day, Jay and Vee use their phones to record details about the learners, such as absences and fundraising contributions. They are also used to take photographs of the worksheets for the day. For the benefit of those learners who are absent, these are then posted onto their respective parent *WhatsApp* groups as an attachment. The parent *WhatsApp* Groups are used primarily to communicate about matters relating to schoolwork, events and general concerns about discipline.

Jay and Vee are the administrators of these groups. Both teachers use their smartphones periodically throughout the day to communicate with parents or with colleagues via text messages, primarily on the *WhatsApp* and Gmail platforms. While the school does not have a policy that explicitly governs the use of digital devices on the premises, there appears to be a verbal understanding of responsible-user practice amongst the staff. '*Teachers appear free to*

make their own decisions about how to use their laptops and when to access their phones.' [Fieldnote #3.130224]

It is this last point based on my fieldnotes, that served as a prompt for me to identify additional data revealing concerns that Jay and Vee expressed about what it is like working in a teaching environment where there is no coherent Information and Communication Technology (ICT) policy. This is in addition to also having to contend with looming power outages, poor connectivity and budgetary constraints. The following extract from my interview with Jay and Vee contains relevant information that emerged in response to my observation about the school's apparent lack of a coherent ICT policy:

> *"For instance uhm just as on a staff level (↑) when management disseminates information on our whatsapp group.. you have to make sure that you respond uhm [reflective tone] but then again it's not in any policy or anything like that.. it's just [pauses thoughtfully] (↓) something that's been said, so it's not really in any ICT policy or [softer] that you need to respond by x, you know what I mean// You can't be messaged on the weekend like when we said we'd have certain weekends where there is no phone no emails.. just so that you can get your mind right.. there isn't that kind of a time. (↓) it's like you're always on call//… yes, we definitely need a policy here"* [Interview, #63: 050424]

Here, Jay is drawing attention to the informal expectations regarding communication within a staff *WhatsApp* group, particularly when senior management members at the school send out information. While there is an implicit expectation that staff should respond to these messages, Jay notes that this is not formally mandated in any ICT policy. To him, it seems more like an unwritten rule or a cultural norm rather than a requirement that has been officially codified. Jay believes that the lack of clarity about response time - *you need to respond by x* - calls for clearer communication policies to manage these expectations effectively and avoid misunderstandings. While his response is thoughtful and measured in this extract, it nevertheless reveals his growing frustration at a mismatch between his belief in what ethical digital practices should entail and the actual 'spur-of-the-moment', impromptu practices which he encounters on a daily basis at the school.

Jay's reference to '*management disseminates information'* emerges as a veiled criticism in which he holds the Senior Management Team (SMT) at the school accountable for encouraging the kinds of unregulated digital practices that blur the lines between his personal and professional life. When the SMT expects staff to respond to text messages at any time, including

on weekends, Jay says that this creates a feeling that he is '*always on call'* and effectively prevents him from mentally disconnecting from work. Vee's experiences of being 'always on' are in line with Jay's. With regards to parents being able to access her at any time of the day, the following extract echoes Jay's previous sentiment:

> *Ja ja (.) there's no line, there's no stop really, because you.. [rising pitch] because of what is open you just need to be open to everybody else's (↑) [J laughs haughtily] you know they have access to you, you need to be there…so there's so there's no line when it comes to technology and parents (↓)* [Vee, Interview, #66: 050424]

She is speaking about how unregulated digital practices place unrealistic expectations on her and she feels completely exposed when 'they' (referring here to parents) always 'have access to you'. When Jay *laughs haughtily* at Vee's statement that *'you just need to be open to everybody else's*, it is confirmation that he shares her experiences and can relate to the 'truth' behind her opinion. The theme of technology-facilitated blurred boundaries, especially in the context of teacher-parent communication, arises as a constant concern for them. Vee feels an implicit obligation to be constantly available to respond to communications from parents, as the technology provides constant access. Although there is not necessarily an explicit expectation set by the school, there is still a perceived expectation from parents for teachers to be available and responsive to their messages or calls at any time. Through these extracts both Jay and Vee reveal their perception that there is a lack of clear guidelines on appropriate communication times and teacher availability.

When Jay says '*it's not really in any ICT policy',* he is stating that the school does not have an actual ICT policy in place to regulate digital practices. The fact that informal expectations, like responding to *WhatsApp* messages from management, have become the norm, is evidence of this. Jay's understanding of the importance of having a clear and comprehensive ICT policy, is that it would outline communication protocols, leaving no room for ambiguity in how teachers and parents conduct their digital practices in matters relating to the school. He also believes that a formal ICT policy would establish professional boundaries in which acceptable hours for work-related communication is defined. More importantly though, Jay's response reveals a deeper need to feel protected and empowered so as to be able to assert his right to disconnect outside of work hours. For Jay and Vee, a well-defined ICT policy would ideally provide a framework for navigating the complexities of digital communication in the workplace. In finding themselves under increasing pressure to respond to digital communication from parents and colleagues, these extracts reveal that it is important for Jay and Vee to be able to effectively

manage these expectations, to establish boundaries, to create a healthy work-life balance and to feel empowered by technology.

At a socio-material level, these extracts show that the relationship between the material elements of digital communication platforms and the social expectations they produce within the school setting, is highly ambiguous. We see a social expectation for staff members to respond to information disseminated by management on *WhatsApp.* These expectations are commonly understood and practised by the group. The expectations around the use of *WhatsApp* for work-related communication reflect a digital etiquette that has evolved in the workplace, blending the material use of technology with the social dynamics of professional interaction.

The extracts also reveal how the materiality of *WhatsApp*, intertwined with informal social practices, shapes the experience of teachers. *WhatsApp* is not merely a neutral platform, but acts as an agent shaping communication practices. Its affordances – instant messaging, group functionalities, read receipts – influence how information flows and how urgency is perceived. The absence of a formal ICT policy also creates a vacuum which is effectively filled by the affordances of *WhatsApp*. The SMT utilises the platform to disseminate information, and given their more powerful position, it creates an implicit expectation for immediate acknowledgement, even without explicit policy backing. The seemingly mundane act of using *WhatsApp* for school communication reveals a complex interplay of social structures, material affordances, and power dynamics. This observation ties in with Jones and Hafner's (2021) notion of 'technologization of practice' in which dominant technologies control the way in which we do certain things.

When Jay says that *'we definitely need a policy here'*, he is fully convinced that the norms, expectations and routines related to digital technology use at the school, must be reflected within an underlying ICT policy. As I have shown, the presence of such a policy would have both symbolic and practical value for Jay and Vee. It would meet their need to feel less exposed and vulnerable to unpredictable shifts in the way in which digital practices unfold within their school domain, especially when it comes to privacy concerns. It would help to make them feel more confident in their ability to leverage the affordances of digital technology when expectations and norms are clearly stated and consistently practised across the school.

Sefton-Green et al (2016) argue that it is important for national ICT policies to become entrenched at school level to bridge the gap between broad national visions and the practical realities of implementation. While they state that national ICT policies should set the overall

direction and goals for digital literacy, they believe that such policy discourse must recognise "the messiness and complexity of literacy in a digital world" and resolve to move beyond a skills-based approach (Sefton-Green et al, 2016: 19). Entrenchment, according to Sefton-Green et al (2016), occurs when schools actively interpret and implement national policies in keeping with the unique socio-material and cultural factors which shape them over time. This in turn encourages a sense of ownership and buy-in among teachers. In this way, when a policy becomes embedded within curriculum frameworks, learning objectives and teaching resources that contribute to the culture and practices of a school, it becomes part of an assemblage - an immaterial entity that has material consequences for how teaching and learning takes place.

5.4 Societal expectations and the digital repertoire

When it comes to understanding the materiality of digital communication technologies like *WhatsApp* in a broader educational context, the nested circles model reveals the complex interplay of individual agency, institutional structures and broader societal forces. Jay and Vee's reliance on *WhatsApp* reflects their attempt to navigate evolving parental expectations for engagement, a social practice increasingly influenced by societal norms around instant accessibility and responsiveness. These societal expectations, driven by the pervasive nature of digital communication in everyday life, create pressure on institutions like schools to adapt and often lead to a blurring of boundaries between professional and personal spheres. For Jay and Vee, the efficacy of this medium is eroded by a mismatch between their expectations of what constitutes reasonable teacher accessibility and the actual unrestricted way in which parents message them. The following extract from Jay's diary captures his feelings about being controlled by devices, indicating a sense of overwhelm due to the constant demands of being online and accessible:

Day 1

05:00 - Waking up to messages from parents wanting to know about their learners. wishing I did not have to respond to questions at the start of my day.

09:00 - Communicating with parents via the platform WhatsApp about homework that was incomplete, sending pictures of new homework in the group. When do I attend to my learners and start intervention? The time I spend on my mobile phone to communicate so early on, in my day with parents, seriously could have spent productively with my learners.

13: 00 - During the course of my day I check my phone for messages from parents, record pictures of history projects and natural science assignments. Keeping them up to date with relevant information that is due for the following weeks to come.After hours - I am exhausted from the day, (MESSAGE NOTIFICATION) What now! A parent… I have decided I am not going to open the message… This constant communication is draining my spirit. [Jay, Diary entry, #1: 250424]

In this entry, Jay speaks about the incessant stream of messages and queries from parents, which begin as early as 5 am and persist throughout the day. This constant digital communication is not only disruptive to his personal and professional routines but also detracts from the time he could otherwise dedicate to his learners. The demands created by this constant digital communication are further exacerbated by the need to produce and share differentiated learning materials, as well as the pressure to keep parents informed of upcoming deadlines and project submissions. Jay's expression of exhaustion at the end of the day, coupled with his decision to refrain from opening yet another message, underscores the emotional toll this digital overload appears to have on him.

Vee's sentiments expressed in this extract from my interview, echoes Jay's experiences:

"we are supposed to switch off a little bit.. I had enough now, but sometimes you have important questions and you have a quick reply (↑) so with technology there's no uhm privacy.. ja they have total disregard of what time it's allowed not to text a teacher at night. (↓) whether its homework whether it's a question whether its this or that.. uhm.. so.. theres no line (↑)" [Vee, Interview, #59: 050424]

When Vee receives texts late at night from parents concerning their children, this triggers her concerns about the lack of privacy and respect for her personal time. Although the messages pertain to important matters regarding the learners, such as homework or questions needing answers, Vee feels that there should be a time to *'switch off'* and rest. She feels an implicit

obligation to be constantly available to respond to communications from parents, as the technology provides constant access. Although there is not necessarily an explicit expectation set by the school, there is still a perceived expectation from parents for teachers to be available and responsive to their messages or calls at any time.

Consequently, she indicates a need for clearer boundaries or protocols regarding communication outside school hours in order for her to strike a healthy work-life balance. The issue of teacher accessibility and the resultant inability to disconnect from work, induces an emotional response from Vee who clearly feels overwhelmed, anxious and stressed by the continuous barrage of text messages which she is expected to process outside of her working hours. This is the primary theme that also arises in her digital diary. The following extract once again reveals the tensions that arise as a consequence of her digital engagement blurring the lines between her professional duties and her personal time:

Day: 2 Thursday

Routine is basically the same, unless a parent is nagging about something mundane then I don`t even bother to open the message but for the mere fact that I`m even engaged with a device that seemed to control my very existence, it`s challenging to say: Today I`m not going to answer my phone, or open my laptop, because what else does the world have to offer but robots that control you? You should be in control of your own world, yet we have let the world control us and we`re not even aware how much it consumes us. I try to limit my interaction with devices as I`m trying to prepare myself to mentally detox from the week , having a present and stimulating conversation with the kids and my family that I have neglected, [Vee, Diary entry #3: 110424]

For Vee, her family and friends are important. Here she mentions the desire for more stimulating conversations and face-to-face interactions with the family, suggesting concerns about how digital technology might be transforming family dynamics and the cultural practice of family communication. This implies that her digital practices are interwoven with and shaped by familial relationships and expectations. As with Jay, she also expresses a lack of agency in feeling that she is being controlled by devices: *"a device that seemed to control my very existence"*. The desire to step away from technology and engage in offline activities suggests a valuation of certain cultural practices that are seen as being at odds with a social media lifestyle. This insight speaks to a tension between different cultural value systems and the place of digital technology within them. When Vee decides to take a 'mental detox' it signals her critical engagement with digital technology, questioning its impact on mental health and well-being,

social relationships and resisting its all-consuming nature. Choosing to prioritise family interaction challenges the harmful practice of constant connectivity and signals her need to reconnect in more meaningful (non-digital) ways.

The notion of becoming *'a robot'* and feeling controlled by technology reflects a concern (an existential anxiety) about how digital tools might be shaping her future behaviour, her identity, her interactions with others, her self-perception and the way in which she sees the world. More importantly, this robot metaphor can be viewed as a critique of a business model that uses incentives which are fundamentally misaligned with well-being as it reduces individual autonomy and control. Her decision to switch off devices and focus on tranquillity and peace reflects a conscious resistance to the encroachment of technology on all facets of life and indicates a need to establish boundary-setting practice by moderating the amount of personal time that she is prepared to spend on social media.

For Jay and Vee, the constant communication enabled through digital platforms, blurs the lines between their work and personal time and generates affective responses. Social expectations influence the use of technology and we see this reflected in their perception that parents feel entitled to contact them at any time. The pressure to respond as a consequence, appears to derive from Jay and Vee's need to maintain good relationships and to meet performance expectations. Despite acknowledging the affordances of digital technologies in their teaching practice, Jay and Vee are deeply concerned that their professional identity, personal space and privacy is being compromised. They both display mixed-feelings towards the 'connectedness' the internet provides and how it shapes the work of teachers. This interaction between technology and social expectations impacts their experience of being a teacher in complex, tension-filled ways. When they state that the 'always-on' nature of digital communication can and does have a detrimental impact on their workload, work-life balance, and overall well-being, it reflects an ongoing struggle to reconcile contradictions inherent within the digital repertoire.

5.5 Conclusion

This chapter extended the exploration of individual digital repertoires from Chapter 4 to encompass the broader institutional context of the school, adopting a socio-material lens to understand how these factors influence teachers' technology integration practices. The nested circles model served as a framework to analyse the interplay between individual agency (teacher characteristics and classroom dynamics) and the constraints and affordances

presented by the school environment. This model highlighted the dynamic relationship between teachers and the available resources, school policies and leadership approaches, demonstrating how these elements shape the development and enactment of digital repertoires. The component table (Table 4.5.1), introduced in Chapter 4 to analyse individual digital repertoires, provided a structured approach to understanding how these institutional factors affect teachers' skills, practices, beliefs, and access levels concerning technology integration.

From a socio-material perspective, the digital repertoire is not merely a collection of skills and tools, but a co-constructed phenomenon emerging from the interaction between teachers and their environment. Resource limitations, such as limited access to technology or reliable internet connectivity, are not simply obstacles but actively shape the types of digital practices that are possible and valued within the school. Similarly, school policies and leadership approaches regarding technology integration become intertwined with teachers' beliefs and pedagogical choices, influencing how technology is used in the classroom. In resource-constrained environments, this socio-material perspective highlights the importance of understanding how teachers creatively adapt and leverage available resources, often developing innovative practices that transcend limitations. The findings reveal that while teachers demonstrate agency in navigating these constraints, the broader institutional context significantly shapes the development and enactment of their digital repertoires, ultimately impacting the potential for robust digital literacy practices and equitable learning experiences.

Chapter 6: Conclusion

6.1 Summary of findings

In this study, I set out to explore my participants' (Jay and Vee's) *digital repertoires* as these unfolded *in situ* in an under-resourced Cape Flats Primary School. By bringing together Darvin's (2018a) definition of the digital repertoire with Canagarajah's (2017) notion of the spatial repertoire, I defined the digital repertoire as an extension of the spatial repertoire into the digital realm. According to this definition, the classroom as a material ecosystem becomes more than just a physical space when digital resources, devices and online tools are present.

I drew on socio-material theory as a framework. This theory views texts as "relational, mutable, and ephemeral, constantly shifting in meaning and interaction with societal and material factors" (Burnett and Merchant, 2020: 360). I used a qualitative small case study with an ethnographic approach in the research design. I observed, recorded and analysed the different strategies, methods and tools which the teachers were able to use in the process of *taking hold* (Street, 1999) of technology in their daily teaching practices over a period of three weeks. My analysis was facilitated by the use of a nested circles model which emerged as I moved back and forth between the data and theorising of socio-materialism, assemblage and affect. In doing so, I was able to generate an explanatory model to represent the influences on the teachers' digital repertoires. I also constructed a components table as a summative description of the key elements of Jay and Vee's digital repertoires. This table allowed for a granular examination of their skills, practices, beliefs, access levels, and adaptation strategies. Together, these two visual representations provided a multi-dimensional understanding of how teachers navigate the complexities of technology integration within a resource-constrained environment.

In addressing my first research question: *What are the key components of teachers' emerging digital repertoires in the context of a resource-constrained school domain?*, I identified key components such as: limited access to reliable technology and internet connectivity; reliance on freely available digital tools and resources; adaptation of existing resources to fit the constrained environment; integration of technology for specific pedagogical purposes, despite limitations; and a focus on developing learner digital literacy skills within the available resources. My findings show that Jay and Vee actively co-construct their unique digital repertoires as they interact with a range of resources across various semiotic modes. Rather than simply adapting technology based on their individual beliefs or pedagogical approaches, Jay and Vee's digital

repertoires emerge from the entanglement of their individual agency and the affordances offered by the available technologies and resources.

The nested circles model (presented in Chapter 4.2.1 and reproduced below) revealed that their repertoires are shaped by a discourse of control embedded within school-based concerns about a wide range of learner safety issues, including the digital. Both Jay and Vee use digital technology extensively (mainly through social media platforms like *WhatsApp*) to express their pastoral care function. The materiality of *WhatsApp,* intertwined with informal social practices, shapes their experiences. In this instance, *WhatsApp* is not merely a neutral platform, but acts as an agent shaping communication practices between the teachers and the parent community at the school. The nested circles model also revealed how Vee's use of online platforms and digital communication platforms for example, enabled her preference for collaborative learning. It also showed how this was influenced by access to reliable internet connectivity and the prevailing pedagogical culture within the school.

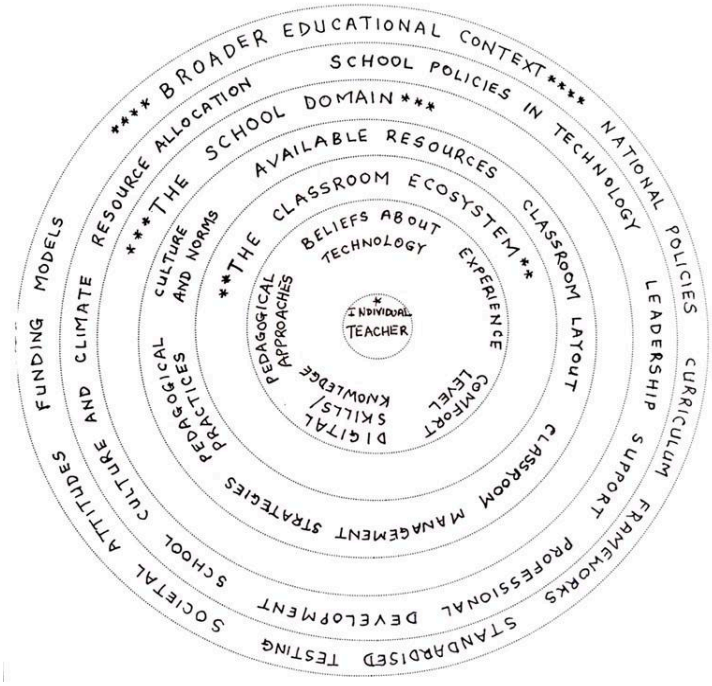

Diagram 6.1 - The Nested Circles Model of im/material influences on digital repertoires

The observed diversity in Jay and Vee's digital repertoires, even within a shared context, points to the distributed nature of agency within socio-material assemblages (Burnett and Merchant 2020). Their agency is not solely individual but is enacted through their ongoing interactions with

the material world of their classroom spaces and broader school domain. This perspective highlights the importance of moving beyond simplistic notions of individual choice and recognising the complex web of material and social influences that shape Jay and Vee's technology integration practices (Prinsloo and Sasman, 2015).

Paying attention to my second research question: *What are the perceived constraints and affordances experienced by teachers when they draw on their digital repertoires to engage learners?* I found that Jay and Vee were generally enthusiastic about the affordances of technology in their teaching practice, displaying a positive digital mindset (Tour, 2015) in the process. Their primary motivation was based on their belief that technology makes their classroom spaces more dynamic and engaging for their learners. In this aspect, I was able to document the ongoing comfort and fluency with which they used digital devices such as smartphones, laptops, data projectors and computers (screen-based repertoires) (Merchant, 2021) in their daily teaching routines and in different spaces such as the IT Lab and the homeroom. My study revealed that their digital repertoires take on a ‘look’ and ‘feel’ that is shaped by the dynamic interplay of the affordances and constraints of the classroom space viewed as an assemblage. Here, I explored how the unique (im)material characteristics of the IT Lab and the homeroom affected the different ways in which Jay and Vee leveraged technology. In both spaces, their repertoires often emerged *in situ*, influencing and influenced by the limited resources, social interactions, literacy practices and pedagogical approaches employed in each setting. In both instances, Jay and Vee’s repertoires are restricted, reflecting elements of deterministic thinking about technology integration (Prinsloo, 2015). Evidence of this could be seen when they used technology as a solution to pedagogical challenges such as learner engagement and classroom management. Further evidence also emerged in the IT Lab where their tendency to equate the use of technology with effective teaching reflected an assumption that technology itself, rather than how it is used, drives learning outcomes. An awkward dualism - a messy ‘grey area’ - in which Jay and Vee’s leveraging of technology to encourage learner engagement and collaboration coexists with their need to use it to maintain control and direct instruction.

Finally, in addressing my third research question: *In what way do broader institutional factors influence the digital repertoire of teachers as they attempt to integrate digital technology into their teaching practice?*, my study has shown that Jay and Vee's digital repertoires are constructed within a complex socio-material assemblage. This assemblage is shaped not solely by individual choices but also by the entanglement of institutional context with their individual

agency and pedagogical beliefs. This constant negotiation within the assemblage creates tension (Liu and Darvin, 2023). Jay and Vee also experienced a tension-filled dichotomy between the potential that available digital resources represent to them and their ability to fully leverage this potential in their daily teaching practices. The instability of the school's (im)material infrastructure emerged as a significant factor in generating this tension. Through the nested circles model, I was able to illustrate how their individual motivations and classroom practices interacted with the broader school and societal constraints they faced. While Jay and Vee demonstrated resourcefulness and creativity in leveraging limited resources, their efforts were constrained by systemic factors including financial constraints, the impact of load-shedding, the lack of a coherent ICT policy in regulating digital practices, the lack of effective professional development and the pressures of the 'always-on' digital culture. These constraints present very real social and material factors that limit Jay and Vee's ability to fully exploit the multimodal affordances of digital technology as they would like to do.

For example, Jay embraces online resources for engaging lessons yet struggles with the encroaching pressure of immediate communication. Vee appreciates the efficiency of *WhatsApp* but finds the blurring of work-life boundaries challenging. Their involvement with technology shapes their sense of positionality (Selwyn et al, 2016) within the school, influencing their interactions with colleagues, learners, and parents in tension-filled ways. Jay's role as the 'go-to' tech person, while informally recognised, added to his workload and blurred professional boundaries. Vee's experiences with inconsistent technology access and limited support impacted her ability to fully integrate technology into her teaching, creating a sense of frustration and limiting her digital repertoire. They struggle to reconcile perceived professional responsibilities with the social expectations and material circumstances shaping their work experiences. This 'always-on' connectivity blurs work-life boundaries, detrimentally impacting their workload, work-life balance, and overall well-being. Consequently, the broader institutional context significantly shapes their digital repertoires, impacting the potential for robust digital literacy practices and equitable learning experiences.

6.2 Implications: aligning policy and practice

Jay and Vee's willingness to share their experiences and insights was invaluable to my study. Their open and honest reflections provided rich qualitative data that illuminated their struggle to align the material reality of technology's complexity with the social reality of everyday teaching. Such participation highlights the importance of valuing teacher voices and perspectives in

educational research and moving beyond simplistic narratives of technological determinism to reveal the nuanced realities of technology adoption in under-resourced schools.

If teachers are considered as the frontline implementers of educational policies and practices, then it stands to reason that their insights are an essential starting point for understanding the realities of teaching and learning across the diverse landscape that characterises South African schooling. This implies that the designers of digital intervention programmes which are instituted in schools must not only embrace these voices, but should also be sensitive to the context in which profound socio-material factors constrain teachers' ability to effectively integrate technology into their classrooms. Ignoring these contextual factors can and does lead to ineffective technology integration initiatives characterised by wasted resources and teacher resistance.

In this regard, my research cautions against ICT Programmes that adopt a 'one-size-fits-all', skills-based approach to digital integration. I have argued that such a deterministic approach neglects the diverse needs of schools and teachers by sacrificing socio-material context in favour of technical skills. I have contended that it erodes teacher agency, exacerbates existing inequalities and perpetuates the myth that access alone is sufficient for meaningful technology integration. When teachers are continuously reminded that they 'lack' the kinds of skills required to be relevant in an increasingly digital world, it ironically dissuades them from embracing the very digital literacy practices deemed desirable in the first place.

Curriculum developers and policy-makers are responsible for ensuring that policy aligns with practice. Considerations about resource provision, infrastructure limitations and digital literacy levels must be located within broader concerns about systemic inequalities in access to technology and digital literacy. This study argues that effective technology integration in education requires a collaborative approach, involving teachers, policy-makers and curriculum developers working together to create supportive and sustainable models of technology use.

6.3 Building a robust digital repertoire

Based on the findings of my research into the digital repertoire, it is clear to me that the training of teachers plays an important role in the integration of technology in the classroom. However, I argue that training initiatives will remain problematic if these continue to ignore the interconnectedness of human agency and material resources. For future digital intervention programmes to be relevant and effective, they will need to move beyond an approach that

simply aims at upskilling teachers' technical proficiency. My research instead points to an approach to the ICT training of teachers that recognises the importance of developing a robust and adaptable *digital repertoire*, grounded in a socio-material understanding of technology integration. I offer the following broad recommendations of what 'should be' in this regard:

Teacher training should be contextualized, recognising the specific resource constraints and opportunities within each school environment and offering practical strategies relevant to their context. It should emphasise how technology can be meaningfully integrated into pedagogy to enhance teaching and learning. Teacher training should explicitly address the challenges posed by limited resources, unreliable infrastructure and lack of technical support. It should foster teacher agency and confidence, encouraging experimentation, innovation, and collaboration. Teacher training should incorporate elements of critical digital literacy, empowering teachers to critically evaluate digital information, navigate online environments safely and responsibly, and address issues of equity and access. As a final recommendation, teacher training should promote learner-centered approaches to technology integration. In doing so, it would encourage teachers to involve learners in the design and implementation of technology-enhanced learning experiences that focuses on content creation and not just passive consumption. Such a step would recognise and value the diverse out-of-school digital repertoires that learners bring to the classroom.

Despite the profound socio-material limitations confronting Jay and Vee, they have shown that they are capable of being thoughtful and effective integrators of technology, creating engaging and equitable learning experiences for their learners. Their ongoing relationship with technology can therefore accurately be described as entangled, deeply affected and ambiguous - "liberating and democratising on the one hand and yet exploitative and disempowering on the other" (Selwyn et al, 2017: 403).

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Appendix 1 Interview questions

1. What digital tools or resources do you find useful when teaching reading and writing?
2. What types of digital tools, platforms or resources do you feel most comfortable using in your teaching?
3. How do you go about incorporating digital technology into your literacy teaching?
4. How does technology play a role in your lesson planning process?
5. What challenges do you face when integrating digital technology into your literacy teaching? How do you overcome or address these challenges?
6. What specific advantages have you identified in using digital tools in the classroom?
7. What sort of changes, if any, have you observed when your learners engage with digital tools?
8. What professional development opportunities have you participated in to improve your digital skills?
9. How do you stay updated on new technologies and their applications in education?
10. How can schools support teachers in expanding their digital repertoires?
11. What strategies do you use to promote responsible and safe use of technology among students?
12. Do you reflect on your digital practices, and if so, how?
13. How would you describe your thoughts, feelings or reactions when using technology both inside and outside the classroom? What are your main concerns?
14. How do teachers in your school collaborate on integrating digital technology into literacy instruction?
15. In your opinion, what does the future hold for the integration of digital technology in literacy teaching at your school?

Appendix 2 Information letter and Consent form

1. Information Letter for participants:

Dear Colleague

My name is Mark Dudley and I am a teacher. I am also currently completing a Master's of Education Degree through the University of Cape Town. I would like to ask if you would be a participant in my research project which will explore how you use digital technologies in your work as a teacher (I call this digital repertoires) and the role that this plays in your literacy teaching. My project is called:

***A case study of teachers' digital repertoires and their roles in literacy teaching in a Cape Flats Primary Schoo*l**

What this means is that I am specifically interested in examining teachers' relationships with digital technology in its varied forms as they draw on their existing digital repertoires in order to work with technology in their teaching practice. I believe that by focussing on what teachers know and can do with technology, as opposed to what they 'can't' or 'won't' do, is a more positive and empowering route to take in research into emergent digital literacy practices. The *repertoire* refers to the diverse ways in which teachers attach meaning to digital technology and make sense of how they use it both in and out of the classroom. I argue that technology should not merely be reduced to a set of learned skills and practices.

I aim to collect data through interviews, classroom observations, document analysis and the completion of a digital diary. I would like to:

- ☐ hold an introductory meeting with you and your colleague as a group for a 30 minute pre-interview session. This will be done a week prior to the start of classroom observations (week 4);
- ☐ 'shadow' you for a week (week 5 of Term 1 2024) from 9 – 10.30am during which time I will observe your teaching by making notes and by capturing video footage of moments where you interact with digital tools;
- ☐ Follow it up with a 30 minute individual post-classroom observation interview, i.e. at the end of the observation week;
- ☐ gain access to curriculum materials, lesson plans, and student work that reflect digital integration where possible.
- ☐ request that you keep a 3-day digital diary in which you will be asked to log your daily interactions with, and use of, digital technologies.

Your participation is voluntary and the confidentiality of the school, as well as the teachers and learners, is guaranteed. The school will be given a pseudonym (different name) and pseudonyms will be used for all participants in the writing up of the research. You may withdraw permission for conducting the research at any time.

If you agree to take part, please fill in the form to indicate your consent for the research. You are welcome to ask any questions regarding this research by contacting me directly via cell phone or email. Yours sincerely

2. Consent form

Teacher consent form:

A case study of teachers' digital repertoires

I consent to	**Yes**	**No**
1, Being observed teaching in the classroom		
2. Being video-recorded working in the classroom		
3. Sharing my curriculum materials, lesson plans, and student work with the researcher		
4. Being interviewed		
5. Audio-recording of the interview		

I understand that my participation is voluntary and that confidentiality will be maintained. I can withdraw my participation at any time.

Name: (Print)

(Signature)

(Date)

Appendix 3 Transcribed interview

	Speaker	**Transcription: This interview was conducted by M as the researcher and took place in a classroom. V and J, both Grade 4 teachers, are present and both have squeezed into a learner desk. School has closed for the day and both teachers appear relaxed and at ease at being able to share their thoughts, opinions and observations. I start at 1.15pm emphasising the confidential nature of the interview…**
1	M	Ok I've got my voice recorder on (.) so the first question is what digital tools or resources do you find useful when teaching reading and writing?
2	V	well basically I like to use the laptop and then I search a story [quickens pace] then I let the learners usually read the story out or read it for them (…) (↓) then I would ask the questions based on the picture that they see… uhm I also explain certain words that is difficult for them to understand.. I ask them questions uhm (.) what do they learn from the story.. you know uhm.. what is, what do they learn… what do they see.. (↑) I ask questions for them to engage in the story… uhm what I like is a variety uhm of stories that they need to improvise.. and the [quickens pace] type of story cause and the voice projection that goes with the story (↑) that is used differently in the calming set up of the classroom.. you see because they are tired of my voice.. (↑) they would like to hear a different voice (.) so that is a (…) I love uhm uh reading to them stories on the internet… it is fantastic (↑)
3	M	So then what type of digital tools or platforms or resources do you feel most comfortable using in your teaching?
4	J	So that would be [soft] most probably laptop data projector uhm the touchscreen whiteboard and then digital platforms… (↓) I use youtube a lot a lot of youtube uhm and [sighs as in thought] beyond that it would either be the the [tone becomes more reflective] uh news 24 things like that, just general news broadcasts (↓)
5	M	And education programs you had math…
6	J	uhm and mathemagics(?) [regular tempo] is another tool we use in the class for natural sciences and mathematics uhm they're programs for both//
7	V	Because that program is installed in the. on the computer//
8	J	And it doesn't require internet at all, it's all offline (↓)
9	M	Great.. uhm next question.. how do you go about incorporating digital technology into your literacy teaching?
10	J	So instead of using textbooks [regular tempo] we rely mainly on the data projector and the whiteboard uhm and as far as explaining or giving more in-depth information the internet is an invaluable resource
11	M	Hm yeah I-I've learnt a lot about how you source your internet here [laughs].. and then uhm how how does technology play a role in your lesson planning process?
12	V	it plays a major role because I.. I like to.. [quickens pace] if I can't explain something (↑) the internet is there to give a broader explanation of what the learner needs to learn.. so they have words that the children can learn from… they explain certain words that I can't explain uhm… [slower] they read certain words.. they just have a broader uhm… the internet just gives a broader explanation.. broader mindset.. they just build learners uhm knowledge based on the videos that I google.. so it's not the.. the videos that I google for the learners.. it is not too far fetched (↑). [slower] it is child based.. so uhm that is what I like about using uhm the internet for the learners (↑) based on the content//
13	J	sorry, just to add on to that (unclear) planning.. when I use internet in planning my own lessons (↑)... [regular tempo] when you just use your textbook for instance you just have one point of view about a certain topic but if you planning using internet to find different resources for the learners you yourself as an educator see other people's point of views on certain topics.. which would.. you know.. obviously help (↑)
14	M	Ok brilliant, thank you.. and then what challenges do you face when integrating digital technology into your literacy teaching, or into your lessons, and how do you overcome or address these challenges?
15	V	well load shedding [all laugh] is a major.. plays a major role uhm.. when I set up a lesson.. when I have this.. look [quickens pace] I'm going to put this lesson up on the internet but load shedding happens (↑) I have to revert back to the textbook or I have to make copies or whatever the case.. so I have to revert back because then I can't, or the other

		thing I have to wait for load shedding to.. to be over [quickens pace] and then I need to go back to what I originally wanted to play for the learners (↓).. so it delays load shedding delays the process of teaching maybe (↑) and uhm the plan for the day. It..it.. it delays my plan for the day and my teaching at that point//
16	J	[intercedes enthusiastically without causing offence] and.. sorry a lack of.. a lack of ICT or lack of resources would really make the lesson less spontaneous.. [regular tempo] if you have access to the internet and you can use your whiteboard you can literally as soon as someone says oh, this weekend we did this.. or we spoke about that then you can immediately delve into that topic and show them about it (↓). But if there's no ICT then its way more rigid.. it's everything that you planned before the lesson (↓)
17	M	Ok//
18	J	[softer] and you might not be able to switch it up on your feet if you could//
19	M	so you need to plan in and around load shedding? What about in broad strokes overcoming load shedding for the school? Are there any kind of.. plans for that? Inverters?
20	J	[makes a blowing sound] we have an inverter for the office so that the telephone and the secretaries (↑), [slower] her internet line doesn't go down cause there [quickens pace] is a separate adsl line in the office. but as far as the school in general [tongue click] we are at the mercy of eskom (↓) [all laugh]
21	M	Okay.. so maybe you could just give me some broad strokes about the advantages that you've identified when you use digital tools in the classroom.. what sort of advantages do you see?
22	J	Uhm enthusiasm from the learners [rising pitch]//
23	V	Yeah it. it. it captures their. their attention [softer]. they are really calm and quiet (↑)... they want to see this pictures and the words.. they wanna.. they don't wanna hear my voice or sirs voice all the time [rising pitch] so the voice captures their attention and that's one advantage I can say… so they are really into this picture that they are seeing (↓)
24	M	Okay.. cause that kind of links to the next question.. What sort of changes, if any, have you observed when your learners engage with digital tools? What kind of changes do you see not only in.. I suppose in how they do things but also in their general personality or behaviour?
25	J	A lot of interest in work. a lot more interest. (↑) uhm [tone becomes more reflective] a genuine a genuine excitement as in. Today I was asked sixteen seventeen times are we going to go upstairs. are we gonna go upstairs [rise in pitch as he imitates learners' voices][all laugh]
26	M	I think you've created something//
27	J	so they.. and again no matter if its social science or lifeskills whatever. (↑) [quickens pace] they would have been so into if I tell them. okay you can go on youtube yourself.. and make sure you search for something with life skills.. they would throw me out a window to get an opportunity.. so never mind me talking to them. (↑) they want to do it themselves.. they want to feel independent in trying to find their own information (↓) //
28	V	Also I think they also would like to the the the lab also provides for them a different set up. [regular tempo] they want to be engaged in technology uhm they wanna show that they can do something on their own and they want to be.. they want to be [unclear] I take it they want to be away from the teacher for a minute. >they don't want to just teacher teacher teacher. (↑) you know. they want to be talking to their friends. engaging with their friends. see what the tiktok and all this things.. uh, youtube tiktok uh ok not facebook [unclear].. but things that they are interest [unclear] but things that keep them interested.. so that is my point of view on the matter [softer] (↓)
29	M	Thank you uhm have you uuuuuh engaged in any professional development opportunities uhm in with regards to improving your digital skills?
30	V	Yes I've done a course on at [unclear] uhm how to integrate technology in the classroom.. that was in last year. (↑) uhm [regular tempo] I must say the lessons that they give is spectacular. (↑) I've learnt such a lot but I would have like to be more [rising pitch] I would like to be [unclear] classroom set up because this is online.. and I'm not saying I'm not learning. I'm learning fantastic. (↑) but certain things you need to apply uhm… let's say if I didn't have internet at home I couldn't have done the the the course but luckily I do have internet at home so it is.. it was fantastic for me to just learn other ways besides my limited way of knowledge that they showed me.. its fantastic (↓)
31	M	You felt empowered?
32	V	I felt empowered although although I must add. I don't use that knowledge in the classroom.. I need to learn how to use the software I have installed like the extension I have installed on my computer. but I want to bring that to class. like there's this part where they do the… where they show you how to create a scanner. (↑) that was fantastic for me.. it was like a project they did… ja… that is fantastic. (↑) so next time I won't when a teacher asks me or a parent asks me

		how.. miss can I have your cell number I will give him the scanner that I created and they can scan it and they get my information (↓) instead of just giving my number on the board
33	M	So basically how do you stay updated with new technologies and their applications in.. in education?
34	J	mmm, [reflective tone] well the WCED, uhm… provides us many opportunities with our workshops uhm… I myself two weeks ago uhm.. (↑) attended a workshop with the ITC champion uhm. so [faster pace] it's different people from each school err the school had to nominate a teacher and that teacher had to take responsibility for going to school and making sure that the rest of the staff knows that. a. that there is IT available uhm.. >that person had to be a point of reference in helping the rest of the staff make use of the IT (↑) so the wced is making sure that at least at every school there is an itc champion and.. uhm.. <there's also growth in that position.. because.. if you are..uhm.. [reflective tone] and if you attend the courses you get different badges and if you get three badges then there's opportunities for you to go educate teachers at different schools (↑) about how to use IT.. so from one aspect the department is keeping us up to date (↓)
35	M	Great.. uhm.. so how can schools support teachers in expanding their digital repertoires.. I know we spoke about different levels of digital comfort.. some some people have less of an inclination? //
36	J	offering some training to… staff members who might not be digitally inclined (↑)
37	M	Would you would you take responsibility for that pilot process?//
38	J	Yeah I'd be happy to (↑) [faster pace] because ultimately now when someone has an issue I get called out of teaching time to maybe go connect me to the internet… put my speaker connect my speaker to my laptop. uhm. you know like simple things (↑) that can be taught quite simply//
39	V	And also last year there was this lady from uhm (.) the WCED or CTI that they have installed a software on the laptop (↓) uhm enable to broaden the.. the teaching method.. [regular tempo] there's certain things on the software you can tap onto this smartware you can tap into and you can change the font you can change the colour (↓) you can go into different pictures.. so there's software loaded on the computer where the teacher can use uhm… it's a little bit complicated for some of us (↑) [rise in pitch] because you have to pre… pre… let's say preprogramme the computer enable to use it.. so.. yes we have done the training the lady came out and she done the training, but we personally haven't used the programme (↓) because it takes a while to to use a programme the software//
40	J	It's the newest smartboards so.. last year we got some brand new brand new smartboards (↑) in the junior primary with the newest software where you can do sooo much [rise in pitch] (.)the teachers only had one training session during one break (↑)//
41	V	Ja, but that was a update.. that was a.. I wouldn't say updated (↑). they just re. how can I say now (↑)//
42	J	But the teachers haven't gotten like a reading show and tell about what those boards can actually do …they're using it like a data projector (↑)//
43	V	Ja mostly ja so it's very limited the use of the software.. ja
44	M	Very astute observation. I I remember that.. uhm ok.. so what strategies do you use to promote responsible and safe use of technology among students? responsible and safe use
45	J	Uhhhhm… [clicks tongue] (↑) ethics… [delayed] what ethical values are we… I say no gyrating [all laugh] ..uhm.. < [reflective tone] a school has certain (↑) ethical values that we are teaching like honesty, respect erm//
46	V	Ja certain values. uhm like. take responsibility for certain things (↑) you know.. they are not allowed maybe to [sighs]… [quickens pace] just to be careful and be responsible when handling other people's things (↑) because these things that we are handling is not our own, you know…
47	M	I think ja I remember you telling them… was it you [looks at J]..I made a note where you said the WCED is watching us.. [all laugh]
48	J	I was just trying to scare them into not searching (↑) …[more haughty laughter]
49	M	So..uhm do you often get a chance just to think about your own digital practices and how that influences your teaching?
50	J	During planning uhm (.) [regular tempo] we're supposed to.. is part of your planning (↑) where you're supposed to write a comment and you reflect on what you've done, so that would be the time when (↑)//
51	V	And what you do for let's say [regular tempo] if I teach natural science, I say youtube videos. uhm. what type of youtube videos because we probably need to put the link in the comment (↓) or we must say the kind of video we're

		going to research (↓) so that we integrate that in our planning and that we make sure that we actually do what we say to acknowledge our planning (↓)
52	M	Okay.. so the next one is just to try to capture your thoughts, your feelings or your reactions when using technology both inside and outside the classroom.. I'd like you to think about not just this but also this.. so its your thoughts.. your emotions.. your reactions as technology gets used..
53	J	It's a great help.. a great help it enhances it enhances [reflective tone] what I can do (↑). for instance my brain is limited to a certain capacity (.) with a machine in my hand depending on my input I can literally find any information that I'm looking for (↓). ja… so even if it's discipline(.) [regular tempo] I have the police or mommy's number I have everything in my hand so.. <so it's a huge extension of what I am able to bring to the children.. without technology its literally a quarter of what I can provide for them(↓)
54	M	So you'd you'd look at it through utopian eyes?
55	J	Ja, definitely
56	M	Ok. Are there any concerns about technology?
57	V	Ja.. the thing is for us there's [unclear] at home you literally don't have.. [louder] because you constantly on your phone with parents texting you after hours (↑) [J laughs heartily]//
58	M	Please explain
59	V	Yes.. they literally text you at 9 or 10 o'clock at night and yes.. it has to do with their child (↑) but you can't just.. we are supposed to switch off a little bit.. I had enough now, but sometimes you have important questions and you have a quick reply (↑) so with technology there's no uhm privacy.. ja they have total disregard of what time it's allowed not to text a teacher at night. (↓) whether its homework whether it's a question whether its this or that.. uhm.. so.. theres no line (↑)
60	M	Do you think it's important then for a school to have a very coherent IT policy?
61	V	I think so..
62	Both	Ja, ja… definitely yes.
63	J	For instance uhm just as on a staff level (↑) when management disseminates information on our whatsapp group.. you have to make sure that you respond uhm [reflective tone] but then again it's not in any policy or anything like that.. its just [pauses thoughtfully] (↓) something that's been said, so it's not really in any IT policy or [softer] that you need to respond by x, you know what I mean//
64	V	Ja..
65	J	You can't be messaged on the weekend like when we said we'd have certain weekends where there is no phone no emails.. just so that you can get your mind right.. there isn't that kind of a time. (↓) its like you're always on call// yes.. we need a policy here
66	V	Ja ja (.) there's no line, there's no stop really, because you.. [rising pitch] because of what is open you just need to be open to everybody else's (↑) [J laughs haughtily] you know they have access to you, you need to be there.. if a parent text you you need to be there (↑). [faster tempo] I wouldn't say they expect you but they also expect you to answer them.. their messages or their calls whatever(.) so there's so there's no line when it comes to technology and parents (↓)
67	M	And one of the basic ways in which they communicate with you is through whatsapp and email.. or just whatsapp?
68	V	Mostly whatsapp.. sometimes they would phone you, but if they can't reach you uhm. (↑)//
69	J	Then emails…//
70	M	So what's your email load like? Do you get a lot of emails?
71	V	Not from the parents but mostly from the office the WCED with these workshops that we need to attend. (↑) theres maybe uhm [louder] projects that we need to do. (↑) the CTI courses.. so there's a lot of communication from the broader WCED (↓)
72	M	Okay.. how do teachers in your school collaborate on integrating digital technology into literacy instruction?
73	J	Mmm. <they use an application by the name of [pauses to think] .. Jolly Phonics. . (↑) so the learners are then able at home to have access to lessons. I know I've used that app before. it's really good uhm in terms of teaching phonics. . (↑)

		[softer] So I know in the junior primary phase they've integrated Jolly Phonics in Grades 1.. 2.. and not sure about Grade 3 . (↑)//
74	V	Ja.. Anthony uhm because I have a cousin. . (↑) [faster tempo] I've downloaded the app for him because he has challenges with reading and stuff.. but yes the app is positive but it also has a negative part to it, because when you see a child is slightly at a back-step with.. with.. reading the jolly phonics music is too fast for that type of learner . (↑) that is not mentally as fast.. you understand.. so that's what I've picked up.. so I told myself [louder] no man this app is.. is not.. it caters for the child who is already on that level.. it doesn't cater for the learner who is a little bit slower.. you understand . (↑) so I thought to myself I used it once and I didn't use it again because it doesn't cater to the child that is at a back-step (↑)
75	M	Okay.. so this will be the last question I'll ask you then. In your opinion, what does the future hold for the integration of digital technology in literacy teaching at your school?
76	J	Ja (.) making technology fully integrated, (↑) [slow tempo] meaning yes they still have to learn how to read and write.. <but I would like to get them like each child has their own workstation. so you get your own notebook… the google chromebook. (↑) so if you need to access the internet if you need anything and you have your own workstation that you can use and your learning materials will be preloaded on your workstation.. >so just like every working adult has a pc the kids would have their own pc in class and you wouldn't have to share(.) take everyone to the lab [indistinct mumble and laughter as he imitates learners] that is my aim that they all had their own little pc.. no one has to touch anyone.. you know what I mean. (↑) even the dystopian.. everyone has their own little headset.. [regular tempo] I'm talking into a mic so you can all hear me clearly because then I don't have to raise my voice and I'm talking into a mic… they all have headphones on and they can all hear my voice. (↓) so that would be my. perfect world. [softer] I would not have to scream I could just have a lapel mic maybe and I could just speak and everyone can hear me and follow the instruction nice and calmly (↓)
77	M	So for every lesson there should be a unique device per learner?
78	J	Yes//
79	M	That would be first prize.. it could be a hand-held device or it could be a desktop… devices... a fully networked school?
80	J	Uhm.. ja..
81	M	Do you think that that is something that will happen in your time at the school?
82	V	I personally [rising pitch] doubt it… because you see coming from foundation phase they are totally still paper.. using paper.. uhm integrating practically… I would rather say start here where the child can write what they see… uhm but me personally I like the (↑) intertween… twining of paper and technology… I like because [faster tempo] the child still needs to write because we still write so…going paperless for me.. erm.. (↓) not not at this stage or in the future because what we are comfortable with or used to and but it will take (↓) for the learner from now up until twenty years. (↑) paper will always be there, but it's a good integration from paper technology intertwining the two.. getting the child to broaden their knowledge.. er.. (↑) their expectations..uhm it is just broad. (↓) so I. I think paper and technology just make a great team
83	M	Excellent. Thank you so much for your feedback and support.. I appreciate the insights and time which you gave so freely…
		Interview ends at 25:10

Appendix 4 Diaries

4.1 Jay's three-day diary

Day 1

05:00 - Waking up to messages from parents wanting to know about their learners. wishing I did not have to respond to questions at the start of my day.

09:00 - Communicating with parents via the platform WhatsApp about homework that was incomplete, sending pictures of new homework in the group. When do I attend to my learners and start intervention? The time I spend on my mobile phone to communicate so early on, in my day with parents, seriously could have spent productively with my learners.

13: 00 - During the course of my day I check my phone for messages from parents, record pictures of history projects and natural science assignments. Keeping them up to date with relevant information that is due for the following weeks to come.

After hours - I am exhausted from the day, (MESSAGE NOTIFICATION) What now! A parent… I have decided I am not going to open the message… This constant communication is draining my spirit.

Day 2

05:00 – Waking up, checking my phone. Thank you! No messages yet. Today is going to be a good day. Getting ready for my class and my lessons I have prepared, however, my happiness is short lived as I was informed on my arrival at school that I have received an email that offers a workshop and it's online.

09:00 – During the day I have received one more email from the WCED informing us about random courses or programmes on offer which I obviously have no interest in attending.

13: 00 - As my day progresses I am constantly reminded about my forgotten absenteeism wherein I need to log into my email account to capture those data. Once again, time away from actively being engaged in teaching and learning.

After school – Slumping down on my couch at home, not giving one thought about my day as I just want to put my feet up and rest. (message notification) Phase Message: Meeting tomorrow

after school and I am expected to reply, not immediately but definitely. When is this going to stop???

Day 3

05:00 - Waking up to a beautiful day that God has blessed us with, I have decided not to check my phone but getting ready for my day ahead.

09:00 – At the start of my noisy and busy day, I pray with my class, flipping my laptop open to connect to "YouTube" application for an English lesson and current events. There is so much information going around, difficult to discern and what to share with the learners as their minds might not grasp the content and the linguistic vocabulary attached to it. I have just settled my learners as I gave them an activity to do, suddenly, I am called out of my classroom to assist a fellow colleague with internet connectivity issues, this ranged from connecting the laptop to the internet to connecting the bluetooth speaker to the laptop.

13: 00 – I take my learners up to the lab, 38 learners versus 1 Educator. Quite a daunting task for one person. This offers the children to be engaged with technology and the broader world around them.

After hours - Children are left waiting for transport, I use my phone to call parents, send voice notes, reminding drivers that children are waiting and want to be home as they are also exhausted from dealing with the constant buzz.

General thoughts and feelings about tech usage:

It is the most important advantage of the modern age, also the greatest distraction. In teaching, I find technology, specifically the internet to be of great use. An invaluable resource for any educator. There are however days that I long for the lost sense of privacy or the feeling of being 'offline'. It seems the price we pay for the endless amount of information is giving up a level of privacy or anonymity. This being said, growing up in the city, I am certainly dependent on it, if not addicted to the 'connectedness' of the internet.

4.2 Vee's three-day diary

Day : 1 Wednesday

Morning: After saying my morning prayer, I check my phone for any messages on WhatsApp, checking the weather and scrolling Facebook for any social media updates with regards to the news and events.

At school: Logging into my email to capture the Learner Absenteeism, checking WhatsApp for messages from parents throughout the morning.

During the day: Setting up my laptop and the projector for teaching, playing different videos that contributes towards learning and teaching.

At Home: After hours messages from parents, colleagues, family members, swimming group etc.

Feeling mentally drained and exhausted from being constantly engaged with devices, parents needing your attention , colleagues notifying you about deadlines and meetings, due dates for assessments! How I relax…playing a movie on my laptop.

Really? No time to read a book and immerse myself into a different world where nobody needs my attention 24 /7

Day: 2 Thursday

Routine is basically the same, unless a parent is nagging about something mundane then I don't even bother to open the message but for the mere fact that I`m even engaged with a device that seemed to control my very existence, it's challenging to say: Today I`m not going to answer my phone, or open my laptop, because what else does the world have to offer but robots that control you? You should be in control of your own world, yet we have let the world control us and we`re not even aware how much it consumes us. Yes it's convenient , fun and it opens a world of endless possibilities, but on the flip side of it, it demands immediate actions, being online, reactions, mental concentration and an overload of information that is sometimes too much for me as I so desperately need a day off from a range of stringent rules and expectations.

Day : 3 Friday

Morning routine is the same, except that I try to limit my interaction with devices as I`m trying to mentally detox from the week , having a present and stimulating conversation with the kids and my family that I have neglected, doing some catching up , however, a message just grabbed my attention.. something happened with an acquaintance, information streaming to my phone…Did my plans of detoxifying my brain and memory from the world just fell through the cracks??? No ! this is my life.. I`m switching my devices off and taking a nap, switching off and entering a world of peace and tranquillity. Where are the days where I was free to explore, being engaged in conversations and laughter, cracking jokes and teasing each other. Now I have become a robot, controlled, consumed, rigid in routine and a never-ending source of power where not even eskom can't switch me off.

Thoughts and Ideas with regards to technology and how I currently feel about it:

We shouldn't allow technology to conquer us but I guess it already gripped us into a space where we can't escape from, however, we still have the ability to take responsibility for our own life and well being, limit the way we engage and interact with devices and check in with reality. Take the time off to converse with an elderly, play with the dog, read a book, and take a trip to the beach. Anything to purify the mind that is contaminated with the remnants of social media.