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Webs of development: Professional networks as spaces for learning

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This article is the result of a professional collaboration between two educationists (working originally in the fields of mathematics and science education), who share a passion for exploring collaborative approaches to the professional development of educators. It extends ideas explored in earlier work by focusing on the concept of professional networks as 'webs of development', and identifying fundamental 'threads' holding a range of different professionals working together in complex spaces of development. The article offers a framework juxtaposing aspects emerging from different research projects, which attempts to hold the complexity around engagement in spaces of development. The framework acknowledges and attempts to capture a sense of the joint responsibility of different professionals involved in the arena of education while conceptual threads of engagement are regarded as weaving through: connectivity, collaboration, negotiation, dialogue and appreciation. Such ideas are presented as a stellar framework for potential research in the future, offering an holistic, learning-focused approach to the concept of professional networks as 'webs of development'. We offer this theoretical article as an invitation for collegial engagement and dialogue – a potential space for learning.

Keywords: development; learning; professional networks; space; community.

Introduction

> All … are caught in an inescapable network of mutuality, tied in a single garment of destiny. …. This is the inter-related structure of reality. (Martin Luther King Jr, 1967, p. 1–2)

The concept of the inter-related structure of social reality, made famous over 50 years ago by Martin Luther King (1967), and scientifically articulated by the likes of Capra (1996), focuses on the complexity of life, the underlying connectedness, the systemic nature of our existence. Conventional linear thought and mechanistic reductionism necessarily yield to ideas of complexity, viewing the world as a systemic organism. Rather than studying parts to understand the whole, understanding of the whole is attempted through analysis of the relationships and connections making up the whole. Yet, the way in which we approach life is so often to deny this complexity. For instance, there is a tendency to split life into compartments or boxes, give them labels, and even give those who work in them labels, and then proceed to operate within those boxes, often ignoring and thereby negating the relationships and connections between them (Katz & Earl, 2010). The discipline-fragmented curriculum in most educational institutions is evidence of this. As Breen points out in his article on dilemmas of change, we 'zoom' in, 'fixing' one part, negating the 'complexity of the phenomenon'. We deal with 'the complicated rather than the complex and so only a part and never the whole' (Breen, 2005).

In this article, we focus on research conducted in the fields of mathematics and science education (Brodie, 2016; Chauraya, 2016; Ngcoza, 2007; Southwood, 2000) around the complex notion of collaborative teacher professional development. Supporting our own research, Chauraya (2016) emphasises the importance of providing teachers with opportunities for collaborative participation and collectivity, offering opportunities for teachers to grow together (Brodie, 2016). A meta-analysis of such research led to the identification of essential aspects or dimensions, fundamental conceptual 'threads' regarded as 'holding' the complexity of what are referred to here as 'webs of development'. Such 'professional networks', are recognised not only as promoting dynamic spaces for learning, but as spaces for building capacity not only *within* educators, but also *between* educators and ultimately *beyond*.

Context

The original research endeavours (Ngcoza, 2007; Southwood, 2000) on which the ideas in this article are based took place in contexts of the professional development of mathematics and

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science educators both at primary and senior levels of schooling. The projects share a qualitative methodology, the orientation described as essentially interpretive (Cohen, Manion, & Morrison, 2018), employing narrative inquiry (Clandinin & Connelly, 1998, 2004) as the fundamental research method. Narratives – the 'medium through which we order and make sense of experiences and events' – were explored to help develop insights into and understandings of 'relational spaces of connectivity' (Baerenholdt & Simonsen, 2004, p. 10). It is in such spaces that teachers grow through the collective development of knowledge (Brodie, 2016).

The research conducted by the authors, on which this article is based, involved a wide range of professionals within the mathematics and science education arena. While most of this work focused on the experience of classroom educators, other members of the educational community involved included teacher professional developers, educational managers, for example school principals, and education advisors involved in forming policy as well as practice.

Experiences of these different members of educational networks, who had been working together for an extended period of time, were explored through narrative inquiry. The narratives of experience were captured, analysed and fed back in generative cycles of inquiry and meaning-making, identifying emerging dimensions of engagement; that is, interpretation was generated through a 'dynamic ongoing construction of meaning – a process of negotiation' (Southwood, 2000, p. 33).

Orientation

The ideas presented in this article are located within a discourse of social practice informed by the ideology of Actor Network Theory (ANT) (Callon & Latour, 1981; Edwards, 2002; Latour, 1999; Law, 1999; Singh-Pillay & Alant, 2015). ANT reflects the interrelated complexity of life and learning, involving a shift of focus from individuals to the collective (Chauraya & Brodie, 2017). Such an approach suggests symbiotic connections among participants. This is critical since educators, their practices and their contexts are regarded here as 'interrelated' – inextricably linked – and learning spaces are understood as sociocultural contexts to which participants bring and share diverse cultural and social knowledge (Mavuru & Ramnarain, 2017). In Vygotskian (1978) thinking, the notions of knowledge and learning are regarded as products of sociocultural activities rather than of isolated minds. Interactions between participants are regarded as the building blocks of networks.

This ideology is based on the notion of spatiality, a concept that combines conditions and practices of individual and social life. The concept of *space* is regarded here as:

> a dimension of social relations and imaginations: it is not an objective structure but rather a social experience … a conception conducted by way of people's social practices in their involvement with the world. It is a social construct … constituted by, as well as constitutive of, social relations and social practices. (Baerenholdt & Simonsen, 2004, pp. 1–2)

It is a notion of space that is not absolute but rather relational, focusing on the idea of connectivity (Brodie, 2016). Important threads of this re-imagination include the notion of spatial flows and an intellectual context where space is frequently being imagined as a product of networks and relations (Jones, 2005).

We are concerned here with a three-dimensional approach to space – space *within*, space *between* and space *beyond*. The space 'within' is about the space 'inside' participants. The space 'between' is about the space of interaction between participants and the space 'beyond' is that space which is neither within nor between, but space that is yet to be defined. Of course, these spaces are inextricably interwoven, but contrary to denying the complexity, this model is designed as a framework to *hold* the complexity, attempting to capture the experience in layers of depth and richness.

Concept

According to Imenda (2014, p. 188), concepts reflect 'theoretical concerns and ideological conflicts'. Hence, this research focused on the concept of professional networks as spaces for development in education. In their seminal work, Chauraya and Brodie (2018) refer to such professional networks as professional learning communities central to which are collegial conversations to foster learning. In attempting not only to recognise but to celebrate complexity, we use the imagery of webs, to illustrate the ideas presented. We begin by articulating ideas pertaining to *development* and *learning* with specific reference to the context of professional networks. Then we describe our ideological orientation by identifying the main structural spaces and threads of the web, acknowledging that these do not stand in isolation but are intricately enmeshed with each other. We offer the image of the web as a model for conceptualising spaces of educator development (Nel & Luneta, 2017), and a framework highlighting conceptual threads that might be more consciously woven in to support future research.

Development and learning

Development is not simply change but a rather a complex, dynamic and dialectical process of qualitative change (Verosov, 2014; Vygotsky, 1978, p. 189). Verosov (2014, p. 132) highlights that the term 'complexity' entails 'the qualitative re-organisation of a certain system which includes several essential aspects'. Inspired by work on the evolution of professional learning communities (Brodie, 2016; Chauraya, 2016; Chauraya & Brodie, 2018), the concept of development is defined here in a broad and holistic way as 'a process of interacting, understanding, growing together; of rebuilding and reconceptualising hope and trust; and of coping with, experimenting and contributing to meaningful change' (Jain, 1997, p. 5). In order to develop we need to learn. Learning is vital, an essential process in life without which we stagnate or regress. If we are not learning, we are not moving, we are not growing, and we are not developing.

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The concept of learning is regarded here as a complex process, a process of overlapping, interlocking, juxtaposed layers of understanding, that deepens, widens and enriches our understanding of the world, leading to qualitative change (Verosov, 2014). Learning is viewed as 'an ongoing, interactive and mutually enhancing process of questioning, discovering, reflecting, sharing and inventing what it means to be human, both individually and collectively' (Jain, 1997, p. 5). It is non-linear, non-homogenous, neither spatialised nor distributed. It is about growth, not deficiency. It is about celebration, not demoralisation. It is a process of *engagement*, not transmission (Kennedy, 2005). The concept of learning drawn on here moves beyond the constructivist focus on individual cognition, encompassing Vygotskian (1978) ideas around socioculturism, locating it in the spaces both *within* and *between* people.

While we are concerned with the concept of learning as a life-long process, it is not viewed here as a linear, continuous process, a movement from one point to another along a continuum of development. Rather, we are exploring a way of looking that reflects the complexity of development, seeing it as an iterative process. In so doing, we are keen to work with a concept used in the wider field of development – the idea of '*contiguum*' – implying 'complementarity within a context' rather than 'separation in time' (Pirotte, Husson, & Grunewald, 1999, p. 45). Thus, in this article the idea of learning as a contiguous process underpins the notion of collaborative professional development.

Professional development

The concept of development is situated here in terms of educators (in this case mathematics and science) as professionals: 'A … process of professional growth and fulfilment, resulting in an improved quality of educational understanding and practice' (Southwood, 2000, p. 19). Building on ideas of learning organisations (Senge, 1990), communities of practice (Lave & Wenger, 1991) and professional learning communities (Brodie, 2013, 2016; Chauraya & Brodie, 2018; Tam, 2015), the process of professional development (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003) is regarded as a cultural practice engaged in by participants of various communities, a collaborative praxis in which participants are involved in negotiating meaning and developing improved understandings in professional communities of learning. Implicit in this approach is the active involvement of educators in an ongoing process of professional learning and growth, as reiterated by Brodie (2016) and Chauraya (2016) in their studies on professional learning communities of mathematics teachers. It is a concept of development that is *about* educators, *for* educators, *by* educators, *with* educators. Educators are regarded here as change agents whose role is to implement the curriculum in the classrooms (Hameed, 2013). Hence, there is a need to optimise teacher learning, perceived here as a long-term collaborative process (Chauraya & Brodie, 2018; Ono & Ferriera, 2010). The process of professional development through professional networks advocated here is a collaborative one, where educators 'negotiate' their own development as well as that of others (Southwood, 2000).

Professional networks

The basic premise of this article rests on the potential strength that can be gained from building, and building on, constructive relationships *within*, *between* and *beyond* educators. Professional networks, or networked learning communities (Katz & Earl, 2010), are regarded here as webs of interaction, appropriate environments for enabling and enacting processes of collaborative professional development. These comprise individuals who come together from different environments to engage in development activity informed by their own knowledge base and experience, co-constructing new knowledge together, learning *with*, *from* and *for* others. Such environments aim to foster co-engagement and interaction in sociocultural negotiation of meanings in constructive and reciprocal ways (Ngcoza, 2007) and have, we believe, the potential to not only be spaces of interaction, but *webs of development.*

Webs of development

Building on the insights and understandings gained from our own and others' research (e.g. Hameed, 2013; Mukedzi, 2013; Ngcoza & Southwood, 2015; Singh-Pillay & Alant, 2015), and incorporating thinking from the wider development arena (e.g. Lewis, 2001; Pirotte et al. 1999), we have developed a conceptual model (Imenda, 2014) for researching the concept of professional networks of learning. To Imenda (2014, p. 189), a conceptual model or framework entails combining a number of related concepts to explain an event or phenomenon. In the context of our article, the intention was to identify dimensions and processes of engagement within 'webs of development'. While the concept of 'webs' has the unfortunate potential to conjure up imaginings of 'entrapment' (Illich, 1971), it is intended to evoke and encompass the complex, contiguous and mutually supportive nature of the relationships involved without the connotations of technicality suggested by the notion of 'network'.

Similarly to Katz and Earl's (2010) networked learning communities, 'webs of development' necessarily imply the involvement of a learning community, in which different degrees and areas of experience and expertise are valued, shared and built on. A space where all are learners, all have something to teach and contribute, and where all have a common interest that forms the foundation of their work – learning. They share a basic desire to learn and apply their learning in the development of education praxis in their own contexts. They learn together. It is not just about learning *from* but about learning *with*, supporting not only one's own development but that of colleagues too. By recognising needs, identifying successes and building on these, it is possible to move forward in developing more effective spaces for learning, that is, communities *of* learning and *for* learning.

In such spaces, the heterogeneity of participants is recognised and responsibility for both their own and other educators' professional development is realised. Further, emphasis is placed on the importance of developing contexts of mutual support that foster co-engagement, co-learning and co-ownership (Ngcoza, 2007).

Threads of development

A meta-analysis of the earlier research (Ngcoza, 2007; Southwood, 2000) led to the identification of five fundamental threads of engagement, holding the spaces and fuelling the pathways in 'webs' of development. Engagement in this context is defined as active participation (Katz & Earl, 2010; Sedlacek & Sedova, 2017), interaction and collaboration with members of the community (Brodie, 2016; Chauraya & Brodie, 2018). Essentially, it is the nature of engagement within professional learning networks that is of interest to us. The threads that emerged through the analysis included: *connectivity*, *collaboration*, *dialogue*, *negotiation* and *appreciation*. These threads are represented in Figure 1. Each of these is touched on here but will be focused on more strongly in future research.

The construct of *connectivity* is identified as a strong conceptual thread, pertaining to the 'stuff that holds the network together'. Within a discourse of sociocultural learning (Mavuru & Ramnarain, 2017; Vygotsky, 1978), and as reiterated by Brodie (2016) and her colleagues, there can be no learning and no development without connectivity. The concept of connectivity is thus employed here in the sense of both intellectual and emotional connection – the sharing of interests and concerns that motivate the coming together and engagement of professionals with a view to learning. Within the ANT orientation, it is recognised that such 'networks' are essentially transient, existing in a process of constant making and re-making (Callon, 1986). It is also assumed that such relational networks are not necessarily coherent and may exhibit conflict. It is, we believe, through th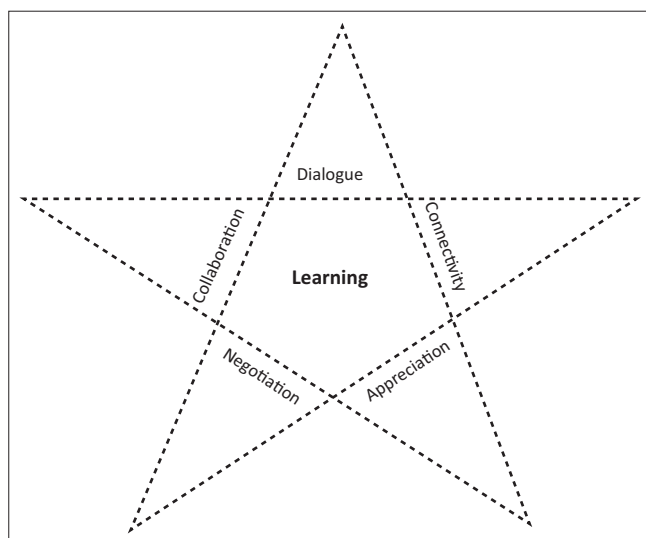e exploration of relations between participants that we can gain greater understanding of the notion of webs of professional development.

The notion of *collaboration* is recognised as being fundamental to mutually supportive spaces of professional development as suggested here. While much work has been done in the area of collaboration and teacher development (Christiansen, Goulet, Kretz, & Maers, 1997; Fullan, 1985; Musanti & Pence, 2010; Stoll, 1992) there has been much debate around its meaning (Hargreaves, 1994). While it is often used synonymously with the term cooperation, in this case the latter is regarded as necessary to, but is not regarded as equating to, collaboration. While cooperation is necessary for collaboration to occur, not all cooperation is necessarily of a collaborative nature. Collaboration is understood here as a dynamic engagement in mutually desired activity. It is the notion of mutuality that fundamentally distinguishes collaboration from cooperation. 'Cooperation alone may serve to perpetuate the status quo, while collaboration, by its inherent dynamic, is more likely to challenge it' (Southwood, 2000, p. 30). While the concept of collaboration is regarded as important, it is not enough.

Building on the fundamentally interrelated nature of the work of educators, the notion of *negotiation* is proposed rather as the basis for professional co-engagement: 'negotiation necessarily implies a dialogical relationship: the intersubjectivity of person/s and context, action and meaning, knowledge and experience' (Southwood, 2000, p. 83). Negotiation is recognised as a fundamental thread of the web, composite threads including negotiation of meaning and the negotiation of people and context, linked inextricably to negotiation of power (Southwood, 2000). Negotiation can be explored in terms of how actors involve themselves and are involved in the network, and how understandings and relationships are developed. Negotiation is recognised as a fundamental process within a complex and contiguously evolving dynamic:

> Negotiation takes place in a space of *dialogue*. Dialogue is imagined here as encompassing the interaction of mind and ideas as well as words … transcending the boundaries of time, space and culture. … [*It*] entails imagination, empathy and making of connections. (Alexander, 2005:2)

Informed by Frierian ideas of 'dialogic education' (Arnett, 1992; Freire, 1970) dialogue is recognised as offering the potential for promoting free and critical learning, and encouraging epistemological curiosity. By opening up spaces of dialogue, ways of thinking may be disrupted and re-negotiated, ideas can be deliberated and understandings can be developed. Through dialogue, prejudices may be faced and engaged with, meaning sought, criticality developed, feelings and thoughts identified, positions recognised and a language of critique and possibility can be developed (Southwood, 2012). Within such a dialogical approach, traditional monological relationships between the 'knowing' expert imparting knowledge and wisdom to the 'unknowing' learner are challenged by participatory notions of teaching and learning – 'a partnership in which all parties take active responsibility' – 'partners in the pursuit of higher learning.

FIGURE 1: Web of conceptual threads.

… It is through dialogue that understandings and practices are re-imagined and re-negotiated' (Southwood, 2012, pp. 91–92).

The developmental orientation underpinning the work outlined here reflects an essentially positive approach to development, *appreciation*, an approach that focuses on growth not deficiency, celebration not demoralisation. It builds on strengths rather than weaknesses, opportunities rather than gaps, and challenges rather than problems. It looks at where we are now and where we want to get to, and promotes development of the space between. An appreciative mode of engagement is adopted in the belief that such a positive and constructive approach to development is powerful in 'locating the energy for change' (Elliott, 1999). Building on the field of appreciative inquiry (Cooperrider & Whitney, 1999), the development processes imagined here build on what *is* effective towards that which is desired. Such processes are recognised as being iterative and contiguous rather than linear and continuous.

By developing further insights around the ways in which the different threads play out in these contexts, we can look at how future webs of development can potentially be fuelled. We need to ask such questions as what constitutes constructive engagement in professional networks – what does it look like and what motivates it? Meta-analysis of the earlier research projects has resulted in the development of a simple conceptual model which may be useful in framing future research. The framework outlined here offers a conceptual space for further exploration.

The visual model offered in Figure 2 is developed from that offered by Ngcoza (2007), and is presented here as a possible
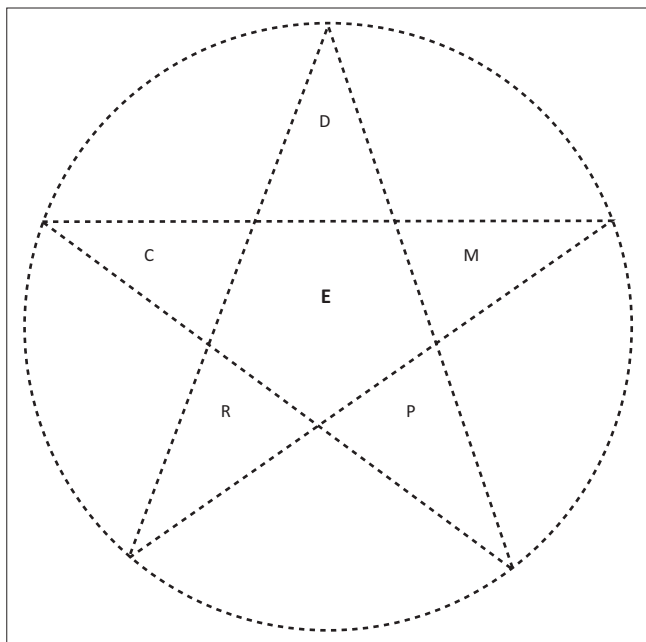
E, educators; C, classroom practitioners; D, developers*; M, managers; P, policymakers; R, researchers.

*, The term 'developers' here refers to educationists involved in the facilitation of teacher professional development activity.

FIGURE 2: Web of potential interaction.

way of conceptualising the notion of professional networks – and, alluded to earlier, emphasising connections *within, between* and *beyond* communities of practice (Lave & Wenger, 1991). The stellar network offers a symbolic model articulating the potential interconnection of different possible professional learning (sub-) communities – communities of practice. The triangles can be seen to hold the space *within* each educational (sub-) community; the pentagon can be viewed as holding the space *between* the (sub-) communities, while the circle can be seen to hold the spaces *beyond*.

While the model may appear rigid and somewhat deterministic, it needs to be regarded symbolically. It could be viewed more topologically, so as to offer a greater feeling of the movement and potential relational flow of engagement. While the triangles at the points of the star hold the spaces of the sub-communities, the central pentagon represents the overlap between all the different components of the web. The outlines of the circle, the star and the pentagon are perforated to indicate potential flows of engagement *within*, *between* and *beyond* communities.

The illustration (Figure 2) represents conceptual threads identified as holding the space together. It is important to note here that these are not considered to be necessarily the only threads holding together such spaces but are those that emerged out of the research drawn on here. The two webs (Figure 1 and Figure 2) represent overlapping, interrelating and interweaving ideas. This web may be juxtaposed with the first, its orientation irrelevant. Together the two stellar frames depict the notion of 'webs of development', the 'threads' regarded as a conceptual mesh underpinning the potential for development.

Concluding remarks

This article has attempted to capture a conceptual space, a space of thinking, in words and images. The task is a formidable one and the concern is that by attempting to countenance all the complexity, we may just get lost in it! In line with the holistic, relational orientation of the approach and the web of ideas offered, we have drawn on a range of traditional 'disciplines' including mathematics, physics, geography, economics and politics. The fundamental threads identified here cut across all of these. The challenge we have attempted to face here is that of confronting the complexity without dismantling it, and to identify and work with the fundamental threads running through it, the mesh that holds it together.

In attempting not to lose sight of ourselves, we have attempted to capture the essence; that is, we have construed learning and development as fundamental to what we as educators are about. We have acknowledged, celebrated and worked with the complexity of professional networks as webs of development. We have explored the development of spaces for learning, spaces where educators are active participants in the co-construction of knowledge (Ngcoza & Southwood, 2015), *connecting* and developing through

collaborative processes of learning, characterised by *dialogue*, not by imposition but through *negotiation.* Through processes characterised by *appreciation,* success is acknowledged and built on, provoking development from where we are to where we want to go – 'the space of the possible' (Cohen & Stewart, 1994).

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

Since this article is based on the authors' doctoral studies in Mathematics and Science Education, which were conducted at the same institution, both authors (K.N. and S.S.) have made a significant contribution in terms of the research drawn on as well as in conceptualising and writing the manuscript.

Ethical considerations

This article followed all ethical standards for a research without direct contact with human or animal subjects.

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Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Disclaimer

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