



# Sustainability of knotworking as a teacher professional development strategy

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## Abstract

Teachers are faced with emerging and often complex constraints that can impact their ability to be pedagogically responsive to learners' different needs. These constraints or challenges were compounded by the COVID-19 pandemic. Thus, I extend scholarship in the field of teacher professional development by exploring the potential of implementing a nuanced form of collaborative intervention strategy called knotworking. There is a growing literature, some of which is discussed in this paper, on the utilisation of cultural historical activity theory-based constructs, which include Engeström's (2000a, 2001) knotworking heuristic, to manage the complex, value-based problems that teachers and school leaders are confronted with daily. This paper is a follow-up study that reported on a year-long knotworking intervention at a primary school in Johannesburg. The findings from the initial project (Andrews, 2024) showed that teachers were able to identify complex problems constraining their teaching and, through collaboration, generate new knowledge and teaching methods and deepen their understanding of how to be pedagogically responsive to the different learning needs of their children. In this follow-up paper, the participants in the initial knotworking intervention were interviewed to explore whether the new knowledge or practices they identified and implemented in the classroom had been sustained a year later. Findings from the qualitative data generated from the semi-structured interviews with the teachers show that much of the new knowledge, which included teaching practices, classroom management plans, or learner interventions that emanated from the knotworking interventions were still in use a year later and, in some instances, were integrated into internal operational policies.

**Keywords:** professional development, knotworking, collaboration, expansive learning, sustainability, transformative agency

## Introduction

Research on collaboration in teacher professional development has received much attention over the last 20 years (Bergmark, 2023; McCotter, 2001; Poekert, 2012; Shavard, 2022). It is widely accepted that collaborative practices are effective mechanisms for supporting teacher professional development (Ainscow & Sandhill, 2010). However, there are relative unknowns that are worth considering. Firstly, there is a "need to give a fuller and more

detailed account of transformative professional learning beyond teacher agency and collaboration” (Boylan et al., 2023, p. 666), where we consider the new knowledge and the relationships with the new knowledge that are developed. Secondly, although there are “calls for professional development strategies that will unfreeze teachers’ current thinking about their disciplines” (Jabulisile & Ngwenya, 2014, p. 186), some research findings show that teachers benefit from contextualised collaborative teacher professional development (Ngwenya & Samuel, 2020). However, little is known about whether schools can sustain newly developed teaching practices derived from collaborative professional development initiatives (King, 2016; Priestley et al., 2011). Also, there is a need for research-based collaboration models that consider the interconnected nature of schools as complex systems when looking to sustain professional development initiatives and the implementation of new knowledge and practice (Sutherland et al., 2023).

In this paper, I present a literature-informed critical discussion of the relative affordances and constraints of Engeström’s (2000a, 2001) knotworking approach as a support mechanism for teacher professional development. Knotworking is a collaborative intervention method drawn from cultural historical activity theory. The structure and workings of knotworking were initially proposed by Engeström (2000a, 2000b) as a method where people working in complex systems (in hospitals, for example) could work together in a specific manner to solve complex problems that exist across and within multiple components in the system.

This discussion is animated with findings from a study to which the researchers returned, a year later, in a primary school in Johannesburg where a teacher professional development initiative was piloted using knotworking interventions. This was to support a group of intermediate phase teachers in overcoming constraints they were faced with, teaching in the wake of the COVID-19 pandemic. In the original study (Andrews, 2024), a cohort of 14 teachers participated in the knotworking intervention for the academic year. The findings from that study showed that, in the immediate aftermath of the intervention, new knowledge and teaching practices had been developed and implemented in daily classroom activities. The central questions posed in the follow-up study, which is reported on in this paper, were firstly, the extent to which new teaching strategies or new policies were sustained and in daily use a year after the intervention and secondly, if the teachers continued to use knotworking in their professional development collaborations.

In this paper, I refer to the sustainability of the knotworking intervention over time. The sustainability of collaboration is generally accepted to be the ability to maintain or support a learning process over an extended period that enables people to work well together (Freeth & Caniglia, 2020). I am aware that revisiting the research site a year later cannot be a sufficiently long to prove with any degree of certainty that the intervention is sustainable, however, it does prove that it was not an event that lasted only “in the moment,” but that it was still ongoing. In addition, I temper the focus on the sustainability of collaboration as a determining precursor for successful professional development where new knowledge and or pedagogical practices are acquired. Sims and Fletcher-Wood (2021) argued that there is no compelling evidence to suggest that the duration of a collaboration programme has any

relationship to changes in the classroom practices of the collaborators or intended audience. Instead, they point to evidence of repeated teaching practice of newly acquired skill as a stronger indicator of the traction of an initiative.

## A review of the literature

### Schools as complex spaces

Teachers often find that the teaching challenges or constraints they face in the school environment are difficult to identify, and even more confusing to solve. This was brought into sharp focus by the COVID-19 pandemic, which shone a spotlight on the problems and inequalities that exist within the unique context of all schools (Carrim & Bekker, 2022). Although role players in a school may have the same objectives they wish to achieve through their collective activity, the problems that arise are often complex and their solutions often cause other unintended problems. One possible explanation is that schools are complex, dynamic systems with many components that include teachers, resources, leaders, and the community all sharing in activity around multiple and sometimes conflicting objectives. The complexity of schools was summed up well by Harris et al. (2017, p. 84) who described the school environment as “a web of social relations, interactions, and micropolitics.” To compound matters, the complexities of school spaces seem to be increasing. This can be attributed in some part to the acceleration of technology in the information age we live in, the increasing diversity of stakeholders in schools, and governance issues (Tikly, 2019). It is important at this point to note that the knotworking heuristic was proposed by Engeström (2000a, 2000b) as a collaborative method, specifically intended for solving complex problems that manifest in systems with multiple components.

In this paper, I recognise that schools are complex spaces. However, as Walton and Osman (2022) attested, the complex problems that teachers face are not insurmountable, and the very complexity and connectedness that typifies schools can be used as a mechanism to identify problems and then provide concrete and applicable solutions.

### Teachers as agents for change

There is good reason to speculate that teachers can be change agents, where they use their existing interconnectedness to collaborate over time to solve problems, and in so doing, make sense of their complex working environments, identify teaching constraints, and discover and implement new teaching practices in their classrooms that are sustainable (Robinson, 2016).

However, research indicates that teachers’ ability to be change agents in schools is constrained by a lack of support from senior leadership, limited opportunity for professional development, and teachers’ reluctance to reflect on or consider different teaching practices. (Meyer & Slater-Brown, 2022)

For this reason, I have considered the teachers’ role in the process of transforming their activity through Stetsenko’s (2020) transformative activist stance. A transformative activist

stance encourages people to not be passengers but, rather, be agentive, active agents in their own lives and the society in which they exist to co-create the world around them with other people. Willing participants in knotworking events discuss solutions to problems and these solutions can be used in workplace settings. This active participation and problem solving can be considered to be agentic.

From the perspective of a transformative activist stance, Stetsenko (2020, p. 51) explained how people transform and co-create their practices by entering a “stream of social collaborative practices” where people’s transformative agency to shape the world relies on the social and cultural resources that they bring into existence in every interaction in which they engage. The social resources within the context of a school include, but are not limited to, fellow teachers, leaders, and support staff who have the agentic capacity to engage in a collaborative community of professionals to solve problems. In the next section, I explain how knotworking can facilitate people’s transformative agency.

## Knotworking

Knotworking is a collaborative intervention method drawn from cultural historical activity theory. The structure and workings of knotworking were initially proposed by Engeström (2000a, 2000b) as a method where people working in complex systems could work together to solve complex problems that exist across and within multiple components in the system.

Knotworking is somewhat different from the normal associations or intended outcomes that we have of collaboration initiatives or coaching interventions. In typical collaboration and coaching, the aim is usually the dissemination of knowledge or the mediation of new skills or policy directives from a so-called expert, where this new information is discussed with the participants. In essence, the intended outcome of a typical collaboration process focuses on the professional development of the participants themselves where individuals develop their competencies or acquire new knowledge by engaging in shared activities. Whereas with knotworking, the focus of problem solving is intentionally directed at an identified constraint, or challenge to activity, that is shared by all participants working in the system. To this end, the focus is on the removal of the contradiction that is constraining the object of the activity, rather than focusing on the individual participants themselves.

From a metaphorical point of view, knotworking can be described as multiple pieces of string representing people with a shared interest in solving a problem coming together; these tied strings represent the knot. The repeated tying and untying of the knots represents a series of collaborative events in which participants engage with each other and share experiences and knowledge to transform a problem into a solution and produce new knowledge that informs new working practices (Engeström, 2000a, 2001). In other words, “knots operate by tying and retying together otherwise separate threads of activity and expertise, involving both rapid improvisation and a long-term perspective of planning and following up” (Engeström & Pyörälä, 2021, p. 10). In summary, knotworking can be described as a rapidly pulsing, distributed, and partially improvised orchestration of collaborative performance between

otherwise loosely connected actors and activity systems, around an identified problem that is constraining activity within the system (Engeström et al., 2012).

## **Knotworking in education: A critical discussion**

Although collaborative professional development has been successful in improving classroom teaching (Bergmark, 2023; Shavard, 2022), there is little evidence to show whether there exists a correlation between collaborative professional development initiatives and the improvement of teaching over a sustained period (Sutherland et al., 2023). It then makes sense to explore mechanisms like Engeström's (2000a, 200b) knotworking heuristic, which has been used successfully to facilitate collaborative professional development in other complex systems in society, to ascertain whether it could be used as effectively in school settings to solve complex problems. However, within the context of this study, the goal of initiating knotworking events is not necessarily to improve teaching but rather, knotworking events are designed to address problems as they arise within the context in which they arise. The identified problem becomes the centre of the knot, and this problem could have to do with a specific teaching issue or it could have to do with dealing with emotional issues, for example. Every knotworking process will focus on the problems, contradictions, or constraints that are unique to the participants of the knot. The focus of this article is to explore whether the knotworking heuristic can facilitate problem-solving for teachers within the complex environment of schools.

Engeström (2000a, 200b) supported the idea of building theory on the use of knotworking in education settings. He argued that standard cooperative continuous improvement methods that are well worn in education settings are not sufficient to bring about sustained changes in practice. Engeström argued that these traditional cooperative improvement methods tend to envision learning as a vertical and top-down process where people collaborate and emerge with higher levels of competence and skill. He suggested that knotworking initiatives instead, allow for the construction of a complementary perspective that combines both horizontal learning with vertical learning, with both dimensions involved in the expansive learning process.

The extant literature describes how knotworking has been used in hospitals, where it was effective in assisting medical staff to develop sustained leadership skills and communication strategies (Colvin, 2017; Varpio & Teunissen, 2020). This led me to speculate whether knotworking interventions had a place in education as a support mechanism for collaborative professional development. Some studies have reported on the success of the use of knotworking in schools. For example, Lecce and Aiello (2021) argued that knotworking practices among teachers represent a viable model for the promotion of sustainable education practices, where it assists educators in facilitating complex educational work, making it more flexible. This supports the findings of Anagnostopoulos et al. (2018) and Kerosuo (2017) who argued that the sustainability of new practices in the workplace can be seen as a core outcome of teacher professional development, and that knotworking methods can help teachers sustain their work and practices.

It was also found that teachers who participated in knotworking interventions displayed an agentic capacity and transformed their working conditions. This was evidenced in the research by Vianna and Stetsenko (2014), who found that collaborative knotworking engagements with teachers facilitated collective transformational change and sustainably changed their future reality. Knotworking was also found to be responsible for internal policy changes in schools that were directly attributed to relational agency between participants in the knots. For example, in a study that investigated infrastructuring projects in schools, where change or new outcomes build on already existing technology, practices, and professional competencies, it was found that using the concept of knotworks and relational agency “teachers were able to create structures, networks, and agreements that were crucial to creating sustainable outcomes” (Bødker et al., 2017, p. 269). From this paper, it was evident that the actors in this school took an agentic stance and engaged in actions that directly changed their reality rather than simply accepting the status quo. This shows that knotworking has the potential to not only create new practices but also create and sustain new agreements. These agreements in complex systems like schools, when formalised, translate into policy changes. Policy changes impact future events and transform practices.

The literature does suggest that knotworking alone may be insufficient to sustain professional development where it was not without its problems, and cannot be seen to be a panacea for professional development. For example, a paper that looked at professional development programmes in Sweden showed that although educators who participated in the knotworking intervention achieved a sustained change in their workplace outcomes, they concluded that for knotworking interventions to be successful the participants cannot be expected to navigate the complex process of addressing the identified constraints on their own, and that the success of the initiative is relative to the amount of support and guidance on offer (Elmberger et al., 2020). Similarly, Melasalmi et al. reported that the relative success or failure of a knotworking initiative with teachers was to some extent dependent on firstly, the structural and physical resources available in a given local context (which in this case included videotaping apparatus) and secondly, the extent to which the participants were “confident in their own knowledge, skills and abilities” (2023, p. 532) to implement what they learned from the collaboration events. From the perspective of the Global South context, this is an important consideration given the inequity in teacher education provision in many developing countries, and limitations on structural and physical resources in many local school contexts (Andrews et al., 2021).

Another critique of knotworking is related to the personal experiences of participating in the events. Melasalmi et al. (2023, p. 533) argued that the “frictional nature” of the knotworking events could have the unintended result of limiting the development of people’s agency. This frictional nature of knotworking results from participants’ differing sense of professional identity and differing capacities for individuals to work together. In addition, some scholars conclude from their research that participants’ differing biases in a collaborative event negatively impact on the “pedagogical pluralism necessary for genuine dialogue” (Matusov & Pease-Alvarez, 2020, p. 16). This is counterintuitive to the idea that knotworking provides a platform for a transformative agency. For my study, this is an important consideration given

that the participants do not all have the same levels of confidence in their professional identity and have different levels of experience and status within the school.

What these findings suggest, is that knotworking does indeed have the potential to facilitate change and assist teachers in developing new knowledge and practices, however, relying on the mechanism alone to accomplish the intended outcomes of professional development has the risk of failing. Therefore, it may be necessary to couple the collaborative methods of knotworking with robust support in the form of ongoing coaching and the provision of material resources to ensure that it achieves its intended outcomes. This claim supports the research of Klar et al., (2020) who concluded that coaching in a professional community is a promising approach for transformative learning for school leaders.

Considering the use of knotworking heuristic in education settings, it was deemed necessary to evaluate its relative success through a lens that considers the complexities involved in teaching and learning in schools. To achieve this, Opfer and Pedder (2011) considered professional development within the context of three domains. These include the individual teacher, the school's influence, and the activities that teachers participate in. Opfer and Pedder (2011) found that traditional professional development was largely ineffective, where the typical focus was on content delivery with little focus on active learning, the professional development was a short-term intervention (typically a week in duration), and paid little attention to systemic issues related to learning, instead, there is a predominant focus on curriculum factors (Harris et al., 2006; Opfer & Pedder, 2011). However, schools that are successful with their professional development initiatives focus on the "creation of social capital conditions and supports for collaboration and networking" (Opfer & Pedder, 2011, p. 21). In addition, schools cannot do this alone; they require support in the form of various continuous professional development initiatives, which include in-school and out-of-school workshops, mentoring, and teacher networking opportunities, to find better ways of identifying teachers' needs to overcome their difficulties (Opfer & Pedder, 2010).

In the next section, I animate the discussion of the literature and Opfer and Pedder's (2011) three domains of professional development by presenting findings from a follow-up study that aimed to look at the sustainability of a once-off knotworking initiative, conducted at a primary school, with teachers who were faced with various constraints to their pedagogical practice. The systematic literature review redirected new forms of exploration and criticality for my fieldwork study. The redirection of new forms of exploration includes firstly Melasalmi et al. (2023), who brought attention to the relative success or failure of a collaborative initiative being dependent on the physical and structural resources available in a given context. Secondly, Matusov & Pease-Alvarez (2020) drew attention to the different biases that people bring to a collaborative event, and how this can negatively impact the pedagogical pluralism necessary for genuine dialogue.

## Research design, methodology, and findings

### The initial intervention

The findings of this paper present data on a follow-up visit, a year later, to a school where a professional development intervention using knotworking was piloted. The initial study that this paper followed up on comes from an article I published in *Professional Development in Education* (Andrews, 2024), where a cohort of primary school teachers at an independent school in the Gauteng Province in South Africa reported that, in the aftermath of COVID-19, they were struggling to meet the different learning needs of their learners. The teachers reported their frustrations and feelings of being ineffective at teaching learners who presented with a variety of different learning and emotional needs that they had not had to deal with before the disruptive event that was COVID-19.

Many teachers reported feeling that they had lost their professional identity, while some considered quitting the profession altogether as a result of feeling ineffective in the classroom. The school's leaders had tried to support the teachers by offering internal workshop initiatives, staff meetings to address teaching challenges, and even securing the services of a psychologist to conduct group motivation sessions. The principal felt that these supportive initiatives had been largely ineffective, and she was open to any new intervention plans. In response, I, a volunteer teacher educator working with the school leadership team at the time, presented the idea of knotworking to the principal as an iterative collaborative professional development programme markedly different from what they had previously experienced. In my capacity as a volunteer teacher educator, I was invited by the principal to present the idea of the knotworking heuristic as a model for collaborative teacher professional development to the teachers. Following my presentation on how knotworking works, I invited teachers willing to participate in such an initiative to volunteer to engage in a knotworking programme. Teachers willing to participate were invited to email me privately if they were willing to take part. The response was positive and every teacher from Grade 3 to Grade 5 responded to my request positively. The principal and most of the teachers mentioned in emails that they were receptive to the idea of trying a new format of collaborative professional development. This was evident when one teacher commented in an email, "I am interested in trying something different rather than once-off workshops for professional development."

In response, a cohort of 14 teachers volunteered to participate. In total 65% of the staff volunteered to participate in this project. The remaining 35% of the staff taught mostly in the foundation phase and in the senior phase and felt that the knotworking initiative was not needed. In the introductory session, the majority of the teachers who volunteered to participate did so because they felt frustrated at not finding solutions to their teaching challenges in the post-COVID teaching environment. At the start of the intervention, the teachers were coached on the theory and application of Engeström's (2000a, 2000b) knotworking collaboration process. I described how the focus of the meetings or knots was always to consider the "problem space" and possible solutions, rather than focus on



individual needs. It was also articulated that the intention was for the teachers to meet frequently over an extended period. The identified problem that was agreed on by all the teachers was the constraints or difficulties they were facing in their teaching post COVID-19. The outcome was to ultimately derive concrete solutions they could implement in their classrooms. It was decided that the knotworking meetings would all take place on Microsoft Teams so the conversations could be recorded and transcribed. This was necessary so that I could access the data to code them for themes. From the initial meeting, two of the teachers volunteered to drive the initiative and facilitate the meetings, where they would ask the group when it would be applicable to meet, and a time and venue would be arranged.

The teachers came together on frequent occasions over six months whenever they had an opportunity to do so. When the teachers came together in the earlier knots, they brought to the conversation their separate threads of expertise (Engeström & Pyörälä, 2021) and shared experiences to identify the discrete elements or problems that contributed to the existence of the global problem. The teachers identified constraints that were making their teaching challenging in five main areas. These included emotional issues linked to anxiety and depression, increased distractibility, and socialisation difficulties all experienced by the children, and for the teachers, ineffectiveness with their previous pedagogical approach to teaching students with different learning needs, and trouble communicating in a meaningful way with parents. In the latter knots, the teachers isolated, identified, and implemented concrete solutions to these problems. These solutions were implemented in classroom contexts to support their teaching, while some were implemented into the school's internal policies to inform school functioning. These internal policies form part of the school's operational code of conduct for teachers, and were circulated among the staff in the form of a policy handbook. On an annual basis, teachers and members of the senior management team will make amendments to the internal operational policies, which are then ratified by the school board and subsequently adopted into practice by the relevant departmental heads.

### The follow-up study

This project was a case study that was located within an interpretive paradigm to reveal the meanings that the participants attributed to their subjective experiences of their everyday lives, and to the wider social world in which they live (Al-Saadi, 2014; Merriam & Grenier, 2019; Willig, 2019). By locating my study within the interpretive paradigm, I was able to provide explanatory interpretations of the lived experiences of the participants' contexts in which they work (Willig, 2019). In the case of this project, these lived experiences were based on the teachers' declaration of previously failed efforts at teacher professional development amongst teachers post COVID. This case study allowed me to investigate the complex social phenomena around the characteristics of the real-life events of a small group of individuals as they unfolded within a school system bounded by space and time (Yin, 2009).

I purposively selected a primary school for geographical convenience and ease of access to the teaching faculty. All the teachers who were approached to participate did so voluntarily.

Permission for both the first and second phases of the study was obtained from the school governing body and ethical clearance was granted by the higher education institution's ethics committee.

Teachers from the intermediate phase of the school (Grades 4–7), who initially participated in the knotworking interventions, were invited back to voluntarily reflect on the relative successes or failures of the new solutions to their teaching challenges that were derived. The teachers agreed to be interviewed individually so that they could reflect deeply on their own experiences of the collaboratively derived solutions to the difficulties they were having with their teaching. Before the interviews took place, the teachers were provided with the findings from the first phase of the study; this was to remind them of the solutions they had come up with a year earlier. All 14 teachers were available a year later and agreed to be interviewed.

This was a qualitative study, where I used thematic content analysis to explore, classify, categorise, and disclose the themes that emerged from the data (Braun & Clarke, 2006; Cohen et al., 2017). The data were collected through open-ended questions that were asked of all the participants in focus group meetings. The open-ended question technique allowed for a level of flexibility to elicit unintended responses. They also allowed me to ask the teachers questions that probed for depth in the responses, test the limits of their knowledge around the topic, and clear up misunderstandings (Cohen et al., 2017).

For the follow-up study, approval was obtained from my institutional review board and the school board before data collection began. The participants in the first phase of the study were asked to provide contact information for a future study at the time of data collection. This meant that a follow-up series of visits could be conducted. For the discussion of the findings, the names of the teachers used are pseudonyms to protect their identities. In the follow-up study, all the interviews were recorded and transcribed verbatim. A detailed line-by-line analysis of each of the interviews was conducted with no priori categories imposed on the data except for the sensitising themes of successes or failure of the knotworking intervention a year after the initial study (Sealy et al., 2023).

After reading and re-reading the transcripts, notes were made in the margins of the transcripts, and excerpts were highlighted where an interviewee expressed an emotive response regarding the success or failure of a particular aspect of the knotworking intervention process that took place in the previous year. These highlighted excerpts were considered the raw data, which were then clustered into first-order themes on the basis of the frequency of response type. The analysis of the transcripts and the thematic tables were reviewed by an independent academic to increase the credibility of the coding process (Sealy et al., 2023).

## Discussion

The themes discussed here relate to the specific teaching and operational interventions to overcome teaching difficulties that teachers had developed in the knotworking interventions in the previous year. These included interventions or methods to address learner anxiety, learner distractibility, socialisation issues, pedagogical responses when teaching, and

interactions with parents. A further first-order theme reported on the relative success or failure of knotworking collaboration as a professional development support mechanism.

In this review of the findings, I discuss each of the themes that were identified from the coding process. I have collapsed the themes of learner anxiety, socialisation issues, and learner distractibility into one higher-order theme called emotional constraints to learning.

### Emotional constraints to learning

From the initial knots, it became evident that the learners were struggling with increased anxiety after the experience of the COVID-19 lockdown and then finding themselves back in school. In the knots where the teachers tied together their threads of experiential and theoretical knowledge, the teachers devised various intervention strategies to assist the learners in coping with their feelings of anxiety. In the follow-up interviews, most teachers (n = 10) reported that the new strategies to help learners cope with anxiety had proven to be successful and were still in use a year later. These included ideas around breaking lessons into discrete units of activity, integrating technology into lessons, and moving purposively between group interactions and individual work. Amy reported:

Yes, we focused on more breaks during teaching. Allowed girls to mix between classes for group work and find a space that worked for them (outdoors, in sitting nooks, etc.). A good variety of individual work and then tech-based work to get the focus.

Most of the teachers (n = 11) commented on how the decision made in the knots to consciously implement group work activities into every lesson was still ongoing and was assisting with mediating socialisation skills to the girls. From the perspective of this cohort of teachers, socialisation among the learners related to them being able to interact and converse with one another, be aware and respectful of each other's differences, be able to confide in others and have them confide in you, and solve issues of conflict or disagreement through negotiation and accommodation of others' points of view and values. It was highlighted in the initial study how the isolation that was experienced through the COVID lockdown had deprived learners of opportunities to have healthy social interactions with their peers. A quote from Susan alluded to this when she said:

Towards the end of last year, after much group work, we did feel overall that the girls were coping better when working with others [in this context, coping referred to less anxiety shown by the girls when working in groups].

To manage conflict, it was decided in the knots, that all the teachers would begin their lessons with a 3-minute reflective talk with the girls on relationships and friendship building. This intervention was still happening a year after it was introduced in the initial knots in the post-COVID era, and was now a part of the teachers' lesson plan format. Amy attested to this and commented on the relative success of this ongoing intervention, saying:

There is ongoing talk at the start of every lesson about kindness and friendships.

In the knots, teachers planned to incorporate extra mural activities into the weekly plans, where children would meet, with a teacher as a facilitator, and engage in matters related to public speaking, friendships, and conflict resolution. Sandra commented:

We now have a confidence club where the girls meet in the afternoons and discuss their emotional problems.

The confidence club was a planned initiative arising from the knots, and was still in place. This is an indication of a sustained and repeated action that resulted from the knot collaborations.

To decrease anxiety, strategies were planned in the knots including changes to the assessment policies and the terminology used around assessment. These strategies are still in place and are part of the school's assessment policy. Sandra commented that the wording used for assessment is softer and less threatening than it used to be, and the format of the formative and summative assessments have changed permanently. This is evident from another two teachers who said:

The school made an effort to decrease the stress around assessments by no longer calling assessments exams or tests but rather use words like . . . check-ins. (Bronwyn)

Last year the Grade 4s did a completely different assessment programme to the usual examinations at the end of the year. The week had some formal assessments but was more project-based and interactive. The girls responded very well to this format and learned a lot during this time. (Amy)

What this finding illustrates is that changes to internal operational policies can have lasting traction. This supports the findings of scholars who found that knotworking interventions have a lasting effect on school practice, where new initiatives are sustained and new policies are created and implemented (Bødker et al., 2017; Engeström et al., 2012; Kerosuo, 2017; Lecce & Aiello, 2021). In addition, the data show that the teachers demonstrated agency and transformed the activity and practice in their working environment. From the knots, teachers devised new teaching strategies related to group work and assessment that they had previously not done. This process of finding solutions to one's problems rather than being told what to do by others is an example of agency. The fact that changes in how the teachers approached their teaching methods resulted from this agentic action indicates that transformation occurred. This supports the view of Vianna and Stetsenko (2014) who explained that through agency, people can effect change in their practice or daily activity.

### Teacher pedagogy

Some research has asserted that professional development initiatives have little long-term impact on changing teachers' pedagogical practices (Whitworth & Chiu, 2015). However, the evidence from my data shows that many of the teaching strategies that were conceptualised in

the knots were still in use a year later. Bronwyn described how the teachers devised a strategy, during the initial knotworking initiative, to provide every child with a whiteboard in class to assist them with concentration and improve their active class participation. Funds were raised to purchase these whiteboards and the use of them has become an integral part of her lesson delivery. The procurement of the whiteboards showed that, through collaboration, new initiatives and actions can materialise. The educational value of the added resources is not the focal point but rather, the fact that group action (through knotworking) can mobilise people to take action around a perceived need shows evidence of relational agency.

I made greater use of whiteboards during some lessons. For these lessons, each learner had a whiteboard and was required to give an answer to a question or participate in a task during a lesson. It also gave the class a chance to see a greater variety of answers within a short space of time. It also required careful thought on their part because they would be required to provide an answer for every question. (Bronwyn)

During the knots, most of the teachers (n = 11) planned to integrate technology into their lessons by considering hybrid teaching, recording presentations, using tablet devices to facilitate presentations, and seeing how computer programmes could support the reinforcement of content that was taught. A year on from the intervention Karen commented:

I also think that finding a good balance between digital and physical learning has been important. Device use and Google Classroom are now far more integrated and natural in our teaching approaches than they were before.

Neither Bronwyn nor Karen had ever collaboratively used whiteboards with learners or integrated the use of technology into lessons. The fact that this is now a part of their everyday teaching strategy is evidence of collaborative professional development affecting change in teacher practice.

Finally, in the knots, the teachers devised plans to scaffold learning, where lesson plans would include different levels of support around each task so that all children could achieve the same objective but have an appropriate scaffolding built into the activity to accommodate their different learning needs. Scaffolding plans are now a part of every lesson plan. This was evident when Susan commented:

In every lesson, we now plan to have different instructions for the same work with more support materials for some girls and more extension questions for others. It's part of every lesson now. We call it scaffolding.

My findings support scholars whose research with teachers who engaged in knotworking showed that firstly, problem-solving through collaboration can have lasting results, and secondly, collaborative professional development can improve the quality of classroom teaching (Anagnostopoulos et al., 2018; McCotter, 2001; Poekert, 2012; Sutherland et al., 2023.). In addition, one new finding or dimension that emerged from this study related to

teacher morale, and how they reported that they felt the knots had offered them a safe space to share their problems and critically reflect on their practice without fear of retribution or coming across as not competent. For example:

I enjoy our meetings because I feel safe to tell everyone about my problems without fear of being judged. (Karen)

Meeting with the team and solving problems together makes me feel good about my job as a teacher. (Susan)

## Impact on parents

The implications of parental conflict and home life issues impacting negatively on children's ability to learn are well documented (Jones et al., 2021). Froiland (2021, p. 124) attested that "the psychological aspects of parent involvement are often ignored in schools, yet they play an important role in learner outcomes." During the initial knots, the teachers identified intervention strategies that they could initiate with their parent community to improve parental support for the girls.

In this study, the teachers reported that the interventions they planned previously were still in use. The majority of the teachers ( $n = 13$ ) mentioned that the plan to show intent by repeatedly and actively inviting parents to events and assemblies had fostered relationship building and networking. This led to teachers receiving more support with learning initiatives from parents. In addition, the awareness generated around parental involvement has had a positive impact on the emotional state of the girls. This was evident from Kate:

The relationships with the parents have definitely improved over the past year. It has been beneficial to foster these relationships as when parents and teachers work together, the most effective learning and reinforcement can occur. An example of this is that parents are invited to assemblies and fun days so that teachers get to know them, and they are involved in the school and feel that they have a say and have ownership in what happens at school.

From the teachers' perspectives, they felt that by taking the initiative to actively engage with parents by inviting them to assemblies, or by having more frequent parent meetings, they would strengthen the relationships and build trust. This is linked to the knotworking initiatives in that this plan to engage with parents was decided on in the knots when it was felt by the teachers that parents needed to be more involved in aspects of their children's schooling.

## Traction of the knotworking collaborative professional development initiative

I intended to explore whether the knotworking initiative had any influence on the teachers in promoting future collaborative professional development. I was interested to see if the

teachers had firstly, displayed agency and continued to meet regularly to solve problems and secondly, if they valued the ongoing collaborative space as a platform to transform their practices. These findings build on the work of scholars who have focused on collaborative inquiry in professional development and the opportunities it presents for transformative professional learning and transformational agency (Liu et al., 2023; Sannino et al., 2016). In addition, some literature indicated that little is known about whether schools can sustain newly developed and implemented teaching practices derived from professional development initiatives (King, 2016; Priestley et al., 2011). My findings add new knowledge to this relatively under-researched question.

The data indicated that the teachers were acutely aware of the benefits attributed to sustained collaboration. The majority of the teachers (n = 13) mentioned that collaboration events played a role in improving their teaching ability, which resulted in enriching the learning experience for the children. In addition, the evidence showed that ongoing collaboration allowed them to learn from one another and share knowledge in relational learning experiences. This is encapsulated by Bronwyn:

Collaboration with colleagues across different subject areas has been beneficial in terms of enriching the learners' learning experience. Being able to focus on a skill from more than one subject area proved very beneficial and the growth witnessed was greater than only approaching the skill from one subject area. I also found it beneficial to have a colleague's support in a particular activity or learning objective. Having a colleague to bounce ideas off and learn from was rewarding. Having a colleague affirm your work was reassuring that you're on the right path and an alternative view would be thought provoking and an opportunity for learning. Working closely with a colleague also provided time for getting to know the colleague better professionally and personally. This enriches future interactions and enhances pastoral care for and from colleagues.

In addition, Susan commented on how meeting regularly to collaborate, has been a useful platform to address issues like classroom discipline.

This year I have enjoyed working with colleagues to see different discipline styles.

These responses from Susan and Bronwyn reflect the feelings of the majority of the teachers who continue to meet on an ad hoc, but regular basis to discuss certain identified issues. This research speaks to what Sutherland (2023) said about there being an urgent need for research-based collaboration models that consider complex systems to sustain professional development.

It was interesting to note that some teachers identified leadership support as a necessary element for the sustainability of the intervention. This was evident from a comment from Amy where she outlined how support and encouragement from the school principal were necessary to maintain momentum, otherwise, the whole process would "fade out."

It's great when you get support and encouragement from the principal, and she shows interest in what we are finding out and stuff. This gives us the motivation to continue to meet even though we have busy programs.

Although support from the principal was important for the sustainability of the professional development initiative, some teachers ( $n = 3$ ) felt that support alone was not enough to sustain the collaboration. The teachers spoke of the need for structural changes to the programme to allow for regular collaborations and that these structural changes needed to be formalised and implemented by the school leadership. This was evident when the teachers spoke about how there had been great enthusiasm for some of the ideas to improve socialisation among the girls around the time that the knots were taking place, however, some of these plans seemed to have been sidelined for other activities, which impacted negatively on collaboration time. This point was made when Bronwyn commented:

The school set some time aside for peer groups across various grades to meet in an effort to create greater cohesion and a sense of belonging. There was great enthusiasm for these group times at the start of the year but over the course of the year the enthusiasm has waned due to other activities being set during those times and fewer of those times being realised than what is conducive to the groups achieving their goal of creating greater cohesion and a sense of belonging.

This finding supports the research of Hargreaves (2019, p. 618), who argued that “reducing teachers’ time out of class makes it almost certain that teachers will collaborate less.” Also, my findings support those of Melasalmi et al. (2023) and Kerosuo (2017) who concluded that adequate resources and programme alignment are important components necessary for sustained collaborative knotworking initiatives.

I conclude that for teachers to become agents of change and transform their working conditions, they need the support of the school management to facilitate the process. This finding builds on the theory of Opfer and Pedder (2011), who considered professional development within the context of the individual teacher, the school’s influence, and the activities in which teachers participate.

When looking at the data it became evident that not all the teachers felt equally enamoured with the idea of meeting regularly to discuss problems and identify solutions. Although the teachers who did not enjoy collaboration were in the minority, it was an interesting finding because these teachers have the potential to derail the long-term sustainability of the intervention. This perspective was described by Amy:

I don't enjoy collaboration because it is controlling.

It was evident that Amy had negative associations with working with her peers and did not enjoy the idea of other people deciding on how she spent her free time. This supports Hargreaves’ (2019) finding that often, teachers have a negative perspective on collaboration with their peers because they associate it with administrative control and top-down



instruction. These findings also align with those of Melasalmi et al. (2023) who concluded that the frictional nature of the knotworking events could have the unintended result of limiting the development of people's own professional agency. This is an important consideration, which builds on the theory of Opfer and Peder (2011), whose research showed how critical the role of the individual is (or teacher, in this instance) in the sustainability of a collaborative intervention. As much as it seems to be that some teachers are not comfortable engaging in knotworking meetings, collaboration between teachers in professional development settings is vital for them to develop new practices. For example, Flores and Day (2006) argued that teachers who struggled to cope in collaborative contexts would be unable to deal with the complex demands of the job.

## Conclusion

The purpose of this paper was to consider the utility of Engeström's (2000a) knotworking heuristic as an intervention strategy to enable sustainable professional development and the development of new teaching practices. It was evident that there is a lot that is useful about using knotworking as an intervention strategy to support professional development, with findings indicating that knotworking initiatives resulted in changed teaching practices that were sustained over time (Elmberger et al., 2020). This shows that knotworking interventions have the potential to promote transformative agency and in turn, provide a strong motivation for site-based collaborative professional development initiatives. The literature also reveals a note of caution, which suggests that knotworking on its own can be fragile and therefore, allowances for its existence have to be made, with ongoing facilitation and coaching recommended to improve the chances of seeing sustainable returns on the time invested. It was noted that enhancing the effectiveness of knotworking and teacher collaboration for professional development in general, requires interventions at a pre-service level to allow for systemic change and to develop a strong sense of efficacy beliefs (Melasalmi et al., 2023). Therefore, to overcome the challenges of initiating and sustaining collaborative teacher professional development teachers need to be exposed to this form of practice in the early phases of their teacher education.

Several conclusions about the use of the knotworking heuristic for professional development are drawn from this study. One of the most interesting findings was that the teachers had implemented many of the changes to their teaching practice that they agreed to from the initial knotworking initiative. One notable example of this is in their pedagogical responsiveness to the emotional needs of the children, where the findings show that the teachers were more sensitive to issues related to anxiety and socialisation. It became evident that the teachers had a greater understanding of how to respond to these emotional needs that manifest in lessons and that specific lesson interventions, drawn from the knot collaborations, were used to manage this. Also, it became evident that the heightened sensitivity to the emotional needs of the students had informed changes in the school's assessment policies, which subsequently, had lessened learner anxiety. Finally, it was found that, even without prompting or external support provision, most of the teachers have continued to engage in knots to solve new complex problems associated with teaching difficulties.

My findings build on the theory of Opfer and Pedder (2011), who concluded that the individual teacher and their agency, the school influence, and the activities that the teachers engage in are critical influences for successful teacher professional development. In this study, the teachers were willing to participate in an initiative to make a change in their environment, the school leadership team supported the idea and allowed for the collaborative meetings to take place, and finally, the formation of knots proved to be an effective engagement activity to support the professional development. Although these findings come from a relatively small study, in one school, with a small cohort of teachers, it was evident that even without continued external intervention or ongoing support from a facilitator the teachers continued to engage in knots and see value in this specific form of collaboration. This refutes the findings of Elmberger et al. (2020) who attributed the relative success or failure of a knotworking initiative to the amount of external support provided.

To further build my theory, I suggest that knotworking interventions could serve as the particular activity that teachers can engage in to firstly identify why certain problems manifest in their environments, and then identify how these problems could be solved. This provides an alternative to traditional professional development programmes that focus on the what-to-do aspect of practice rather than on deeper knowledge of why problems exist in complex systems and how solutions can be found. I also conclude that through their experiences of participating in a series of knotworking interventions, the teachers emerged with a greater understanding of the complexities of teaching and learning, and of the multifaceted, non-linear problems and challenges they face in schools. I argue that knotworking is useful because it allows for, and promotes, regular collaboration.

## References

- Ainscow, M., & Sandill, A. (2010). Developing inclusive education systems: The role of organisational cultures and leadership. *International Journal of Inclusive Education, 14*(4), 401–416. <https://doi.org/10.1080/13603110802504903>
- Al-Saadi, H. (2014). Demystifying ontology and epistemology in research methods. *Research Gate, 1*(1), 1–10. [https://www.researchgate.net/publication/260244813\\_Demystifying\\_Ontology\\_and\\_Epistemology\\_in\\_Research\\_Methods](https://www.researchgate.net/publication/260244813_Demystifying_Ontology_and_Epistemology_in_Research_Methods)
- Anagnostopoulos, D., Levine, T., Roselle, R., & Lombardi, A. (2018). Learning to redesign teacher education: A conceptual framework to support program change. *Teaching Education, 29*(1), 61–80. <https://doi.org/10.1080/10476210.2017.1349744>
- Andrews, D. P. (2024). Teacher professional development through knotworking: Facilitating transformational agency through collaboration to overcome constraints to teaching in relation to disruptive events. *Professional Development in Education, 1–16*. <https://doi.org/10.1080/19415257.2024.2332393>

- Andrews, D., Walton, E., & Osman, R. (2021). Constraints to the implementation of inclusive teaching: A cultural historical activity theory approach. *International Journal of Inclusive Education*, 25(13), 1508–1523. <https://doi.org/10.1080/13603116.2019.1620880>
- Bergmark, U. (2023). Teachers' professional learning when building a research-based education: Context-specific, collaborative and teacher-driven professional development. *Professional Development in Education*, 49(2), 210–224. <https://doi.org/10.1080/19415257.2020.1827011>
- Bødker, S., Dindler, C., & Iversen, O. S. (2017). Tying knots: Participatory infrastructuring at work. *Computer Supported Cooperative Work (CSCW)*, 26, 245–273. <https://doi.org/10.1007/s10606-017-9268-y>
- Boylan, M., Adams, G., Perry, E., & Booth, J. (2023). Re-imagining transformative professional learning for critical teacher professionalism: A conceptual review. *Professional Development in Education*, 49(4), 651–669. <https://doi.org/10.1080/19415257.2022.2162566>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <http://dx.doi.org/10.1191/1478088706qp063oa>
- Carrim, N., & Bekker, T. (2022). Placing inclusive education in conversation with digital education. *South African Computer Journal*, 34(2), 18–34. [https://hdl.handle.net/10520/ejc-comp\\_v34\\_n2\\_a4](https://hdl.handle.net/10520/ejc-comp_v34_n2_a4)
- Cohen, L., Manion, L., & Morrison, K. (2017). *Research methods in education*. Routledge. <https://doi.org/10.4324/9780203224342>
- Colvin, J. W. (2017). Knotworking in an emergency response team: Understanding team communication and process. *Qualitative Research in Medicine and Healthcare*, 1(3), 128–137. <https://doi.org/10.4081/qrmh.2017.7115>
- Elmberger, A., Björck, E., Nieminen, J., Liljedahl, M., & Bolander Laksov, K. (2020). Collaborative knotworking: Transforming clinical teaching practice through faculty development. *BMC Medical Education*, 20(1), 1–11. <https://doi.org/10.1186/s12909-020-02407-8>
- Engeström, Y. (2000a). Can people learn to master their future? *The Journal of the Learning Sciences*, 9(4), 525–534. [https://doi.org/10.1207/S15327809JLS0904\\_8](https://doi.org/10.1207/S15327809JLS0904_8)
- Engeström, Y. (2000b). Activity theory as a framework for analyzing and redesigning work. *Ergonomics*, 43(7), 960–974. <https://doi.org/10.1080/001401300409143>

- Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work, 14*(1), 133–156.  
<https://doi.org/10.1080/13639080020028747>
- Engeström, Y., & Pyörälä, E. (2021). Using activity theory to transform medical work and learning. *Medical teacher, 43*(1), 7–13.  
<https://doi.org/10.1080/0142159X.2020.1795105>
- Engeström, Y., Kaatrakoski, H., Kaiponen, P., Lahikainen, J., Laitinen, A., Mylly, H., Rantavuori, J., & Sinikara, K. (2012). Knotworking in academic libraries: Two case studies from the University of Helsinki. *Liber Quarterly, 21*(3/4), 387–405.  
<https://doi.org/10.18352/lq.8032>
- Flores, M. A., & Day, C. (2006). Contexts which shape and reshape new teachers' identities: A multi-perspective study. *Teaching and Teacher Education, 22*(2), 219–232.  
<https://doi.org/10.1016/j.tate.2005.09.002>
- Freeth, R., & Caniglia, G. (2020). Learning to collaborate while collaborating: Advancing interdisciplinary sustainability research. *Sustainability Science, 15*(1), 247–261.  
<https://doi.org/10.1007/s11625-019-00701-z>
- Froiland, J. M. (2021). A comprehensive model of preschool through high school parent involvement with emphasis on the psychological facets. *School Psychology International, 42*(2), 103–131. <https://doi.org/10.1177/0143034320981393>
- Hargreaves, A. (2019). Teacher collaboration: 30 years of research on its nature, forms, limitations and effects. *Teachers and Teaching, 25*(5), 603–621.  
<https://doi.org/10.4324/9781003141907>
- Harris, A., Day, C., Goodall, J., Lindsay, G., & Muijs, D. (2006). What difference does it make? Evaluating the impact of continuing professional development in schools. *Scottish Educational Review, 37*(3), 91–99.  
<https://doi.org/10.1163/27730840-03703008>
- Harris, J., Carrington, S., & Ainscow, M. (2017). *Promoting equity in schools: Collaboration, inquiry and ethical leadership*. Routledge.
- Jabulisile, C., & Ngwenya, J. (2014). Accounting teachers' understandings and practices of teaching and assessment in a context of curriculum change. *Alternation, 21*(1), 171–189.  
[https://www.researchgate.net/publication/332935080\\_Accounting\\_Teachers%27\\_Understandings\\_and\\_Practices\\_of\\_Teaching\\_and\\_Assessment\\_in\\_a\\_Context\\_of\\_Curriculum\\_Change](https://www.researchgate.net/publication/332935080_Accounting_Teachers%27_Understandings_and_Practices_of_Teaching_and_Assessment_in_a_Context_of_Curriculum_Change)

- Jones, J. H., Call, T. A., Wolford, S. N., & McWey, L. M. (2021). Parental stress and child outcomes: The mediating role of family conflict. *Journal of Child and Family Studies, 30*, 746–756. <https://doi.org/10.1007/s10826-021-01904-8>
- Kerosuo, H. (2017). Transformative agency and the development of knotworking in building design. In M. Goller & S. Paloniemi (Eds.), *Agency at work: An agentic perspective on professional learning and development* (pp. 331–349). Springer. [https://doi.org/10.1007/978-3-319-60943-0\\_17](https://doi.org/10.1007/978-3-319-60943-0_17)
- King, F. (2016). Teacher professional development to support teacher professional learning: Systemic factors from Irish case studies. *Teacher Development, 20*(4), 574–594. <https://doi.org/10.1080/13664530.2016.1161661>
- Klar, H. W., Huggins, K. S., Andreoli, P. M., & Buskey, F. C. (2020). Developing rural school leaders through leadership coaching: A transformative approach. *Leadership and Policy in Schools, 19*(4), 539–559. <https://doi.org/10.1080/15700763.2019.1585553>
- Lecce, A., & Aiello, P. (2021). For inclusive and sustainable education: The profile of the educator and pedagogist in Italy. *Athens Journal of Mediterranean Studies, 7*(4), 289–302. <https://doi.org/10.30958/ajms.7-4-4>
- Liu, M., Hedges, H., & Cooper, M. (2023). Effective collaborative learning for early childhood teachers: Structural, motivational and sustainable features. *Professional Development in Education, 50*(2), 420–438. <https://doi.org/10.1080/19415257.2023.2235578>
- Matusov, E., & Pease-Alvarez, L. (2020). Moving from collaboration to critical dialogue in action in education. *Dialogic Pedagogy: A Journal for Studies of Dialogic Education, 8*. <https://doi.org/10.5195/dpj.2020.292>
- McCotter, S. S. (2001). Collaborative groups as professional development. *Teaching and Teacher Education, 17*(6), 685–704. [https://doi.org/10.1016/S0742-051X\(01\)00024-5](https://doi.org/10.1016/S0742-051X(01)00024-5)
- Melasalmi, A., Tanhuanpää, S., & Koskela, T. (2023). Knotworking—not working: Interprofessional collaboration and co-figuration of pre-service special education teachers. *Research Papers in Education, 39*(3), 516–537. <https://doi.org/10.1080/02671522.2023.2177881>
- Merriam, S. B., & Grenier, R. S. (Eds.). (2019). *Qualitative research in practice: Examples for discussion and analysis*. John Wiley & Sons.
- Meyer, F., & Slater-Brown, K. (2022). Educational change doesn't come easy: Lead teachers' work as change agents. *Mathematics Education Research Journal, 34*(1), 139–163. <https://doi.org/10.1007/s13394-020-00333-y>

- Ngwenya, J., & Samuel, M. A. (2020). Choosing self-professional teacher development strategies: A case study of three rural teachers. *Journal of Education Studies, 18*(2), 84–98. <https://hdl.handle.net/10520/ejc-jeds-v18-n2-a5>
- Opfer, V. D., & Pedder, D. (2010). Access to continuous professional development by teachers in England. *The Curriculum Journal, 21*(4), 453–471. <https://doi.org/10.1080/09585176.2010.529680>
- Opfer, V. D., & Pedder, D. (2011). The lost promise of teacher professional development in England. *European Journal of Teacher Education, 34*(1), 3–24. <https://doi.org/10.1080/02619768.2010.534131>
- Poekert, P. E. (2012). Examining the impact of collaborative professional development on teacher practice. *Teacher Education Quarterly, 39*(4), 97–118. <https://www.jstor.org/stable/23479654>
- Priestley, M., Miller, K., Barrett, L., & Wallace, C. (2011). Teacher learning communities and educational change in Scotland: The Highland experience. *British Educational Research Journal, 37*(2), 265–284. <https://doi.org/10.1080/01411920903540698>
- Robinson, M. (2016). Professional practice schools as a form of school–university partnership in teacher education: Towards a social justice agenda. *Education as Change, 20*(2), 11–26. <http://dx.doi.org/10.17159/1947-9417/2016/496>
- Sannino, A., Engeström, Y., & Lemos, M. (2016). Formative interventions for expansive learning and transformative agency. *Journal of the Learning Sciences, 25*(4), 599–633. <https://doi.org/10.4324/9780203703106>
- Sealy, J., Abrams, E. J., & Cockburn, T. (2023). Students’ experience of isolation room punishment in UK mainstream education: “I can’t put into words what you felt like, almost a dog in a cage.” *International Journal of Inclusive Education, 27*(12), 1336–1350. <https://doi.org/10.1080/13603116.2021.1889052>
- Shavard, G. (2022). From school improvement to learner cases: Teacher collaborative work as a context for professional development. *Professional Development in Education, 48*(3), 493–505. <https://doi.org/10.1080/19415257.2021.1879216>
- Sims, S., & Fletcher-Wood, H. (2021). Identifying the characteristics of effective teacher professional development: A critical review. *School Effectiveness and School Improvement, 32*(1), 47–63. <https://doi.org/10.1080/09243453.2020.1772841>
- Stetsenko, A. (2020). Radical-transformative agency: Developing a transformative activist stance on a Marxist-Vygotskian foundation. In A. T. Neto, F. Liberali, & M. Dafermos (Eds.), *Revisiting Vygotsky for social change: Bringing together theory and practice*, (pp. 31–62). Peter Lang.

- Sutherland, L., Markauskaite, L., & Cruickshank, K. (2023). A complex systems framework for examining the impact of school-based professional learning initiatives: Emerging agentic practices in a collaborative curriculum redesign. *Professional Development in Education*, 49(6), 1087–1102. <https://doi.org/10.1080/19415257.2023.2217432>
- Tikly, L. (2019). *Education for sustainable development in the postcolonial world: Towards a transformative agenda for Africa*. Routledge.  
<https://doi.org/10.4324/9781315211343>
- Varpio, L., & Teunissen, P. (2020). Leadership in interprofessional healthcare teams: Empowering knotworking with followership. *Medical Teacher*, 43, 32–37.  
<https://doi.org/10.1080/0142159X.2020.1791318>
- Vianna, E., & Stetsenko, A. (2014). Research with a transformative activist agenda: Creating the future through education for social change. *Teachers College Record*, 116(14), 575–602. <https://doi.org/10.1177/016146811411601412>
- Walton, E., & Osman, R. (2022). Pedagogical responsiveness in complex contexts. In E. Walton & R. Osman (Eds.), *Pedagogical responsiveness in complex contexts: Issues of transformation, inclusion and equity* (pp. 1–20). Springer.  
[https://doi.org/10.1007/978-3-031-12718-2\\_1](https://doi.org/10.1007/978-3-031-12718-2_1)
- Whitworth, B. A., & Chiu, J. L. (2015). Professional development and teacher change: The missing leadership link. *Journal of Science Teacher Education*, 26(2), 121–137.  
<https://doi.org/10.1007/s10972-014-9411-2>
- Willig, C. (2019). What can qualitative psychology contribute to psychological knowledge? *Psychological Methods*, 24(6), 796–804.  
<https://doi.org/10.1037/met0000218>
- Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). SAGE.