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Finding the Connective Tissue in Teacher Education: Creating New Spaces for Professional Learning to Teach
Trouver une trame connective en formation des maitres : création de nouveaux espaces pour permettre aux connaissances professionnelles de devenir enseignement

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Résumé de l'article

La fragmentation des connaissances entre les cours est une préoccupation fréquente dans les programmes de formation des maitres. Celle-ci contribue à antagoniser les connaissances théoriques propres aux disciplines et la réalité de la pratique enseignante dans les écoles. Suite à l'examen de milieux d'apprentissages scolaires innovants et à l'analyse des connaissances d'enseignants, nous élaborons un concept d'apprentissage professionnel dans le but d'attirer l'attention sur une nouvelle vision de la formation des maitres. Avec pour objectif de créer de nouveaux espaces propres à la formation des maitres, nous faisons appel au concept de portfolios électroniques comme trame connective puissante. À l'aide de points de vue d'étudiants, nous élaborons ensuite les grandes lignes d'un aspect en pleine croissance de notre programme de formation des maitres, de points de vue d'étudiants. Nous terminons avec des réflexions sur la manière dont nous intégrons une compréhension conceptuelle et approfondie de l'éducation aux nombreux récits basés sur la pratique.

FINDING THE CONNECTIVE TISSUE IN TEACHER EDUCATION: CREATING NEW SPACES FOR PROFESSIONAL LEARNING TO TEACH

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ABSTRACT. A common concern in teacher education programs is the fragmentation of knowledge between courses that contribute to separation between discipline-focused theoretical knowledge and teachers' practical work in schools. Drawing on reviews on innovative learning spaces in schools and analysis of teacher knowledge, we theorize a conceptualization of professional learning with an intention to draw attention to a re-visualization of teacher education. We refer to the concept of electronic-portfolios as a powerful connective tissue in creating new spaces for teacher education, followed by an outline of an aspect of our teacher education program, with insights from students, that is emerging. We conclude with reflections on how we are integrating deep conceptual understandings of education with cumulative narratives of education in practice.

TROUVER UNE TRAME CONNECTIVE EN FORMATION DES MAITRES : CRÉATION DE NOUVEAUX ESPACES POUR PERMETTRE AUX CONNAISSANCES PROFESSIONNELLES DE DEVENIR ENSEIGNEMENT

RÉSUMÉ. La fragmentation des connaissances entre les cours est une préoccupation fréquente dans les programmes de formation des maitres. Celle-ci contribue à antagoniser les connaissances théoriques propres aux disciplines et la réalité de la pratique enseignante dans les écoles. Suite à l'examen de milieux d'apprentissages scolaires innovants et à l'analyse des connaissances d'enseignants, nous élaborons un concept d'apprentissage professionnel dans le but d'attirer l'attention sur une nouvelle vision de la formation des maitres. Avec pour objectif de créer de nouveaux espaces propres à la formation des maitres, nous faisons appel au concept de portfolios électroniques comme trame connective puissante. À l'aide de points de vue d'étudiants, nous élaborons ensuite les grandes lignes d'un aspect en pleine croissance de notre programme de formation des maitres, de points de vue d'étudiants. Nous terminons avec des réflexions sur la manière dont nous intégrons une compréhension conceptuelle et approfondie de l'éducation aux nombreux récits basés sur la pratique.

For decades, teacher education (TE) has struggled to address concerns with fragmentation of knowledge between courses and the related disconnection between theoretical knowledge and teachers' practical work in schools (Darling-Hammond, 2006; Grossman, Hammerness, & Mcdonald, 2009; Russell, McPherson, & Martin, 2001). Layered on top of these challenges, education reforms introduced in many western countries, characterized by free markets, privatization, and increased national and individual competition based on neoliberal ideologies, have radically redefined the work of teachers and teaching (Conroy, Hulme & Menter, 2013). Success in teaching has been reduced to measurable outcomes with teachers having more "managed" career paths (Loughran & Hamilton, 2016).

As noted by Loughran and Hamilton (2016), schools have become more complex and diverse with each lesson composed of multiple elements, highly interconnected and interdependent, where the boundaries of teaching and learning are continuously being re-negotiated through technology. These technologies offer layers of complexities between the interactions amongst students and between teachers and students, with increasingly complex contexts not previously imagined. There is a need to shift the language of TE to help teachers develop more effectively to address the needs of students, as they become teachers in a more complex and changing society. Both Loughran and Hamilton (2016) and Hagar and Hodkinson (2011) argued that professional learning has been framed as the transfer and application of acquired theory, as participation in highly contextualised communities of practice, or as adaption as teachers reconstruct and transform their professional knowledge. Loughran and Hamilton (2016) stated, "there is a need to think beyond these, while also retaining and blending ideas that are compatible with a complexivist philosophy of learning" (p. 356). In agreement, we have explored this application of complexivist philosophy. Emphasizing the interaction of parts in a TE program and working from the ground up, we have focused on a relational approach to knowing that offers a perspective that frames human learning and the cognitive processes it entails as distributed in the world and our interactions in that world (Sanford, Hopper & Starr, 2015).

Typically TE programs have "been divided between foundations courses, on the one hand, and methods courses, on the other" (Grossman et al., 2009, p. 274). Foundations courses include knowledge of learners and learning, from educational psychology, including knowledge of the purposes of school, taken from history and philosophy of education, and knowledge of school and classroom structures taken from a management orientation. "Methods" courses have generally included the courses focused on practice, including courses related to the teaching of particular subject matter, planning, management, and assessment. However, as noted by Britzman (1986) and very much still the same,

> the university provides the theories, methods, and skills; schools provide the classroom, curriculum, and students; and the student teacher provides the individual effort; all of which combine to produce the finished product of professional teacher. This training model, however, ignores the role of the social and political context of teacher education while emphasizing the individual's effort. Here, the social problem of becoming a teacher is reduced to an individual struggle. Furthermore, this problem is exacerbated by the dominant cultural view of the teacher as rugged individualist. (p. 442)

Russell and Martin (2016) further commented that quality in TE will continue to remain elusive whilst aspects of TE such as courses, induction, and professional development remain disconnected. As they stated,

> there are no connective tissues holding things together within or across the different phases of learning to teach. The typical pre-service program is a collection of unrelated courses and field experiences. Most induction programs have no curriculum, and mentoring is a highly individualistic process. (p. 1049)

These systemic flaws in TE speak to a need to rethink how we design preservice TE programs. In this paper, we offer insights on a cluster of courses in a TE program that offer us hope that such redesign, focused on promoting the "connective tissue," is possible. However, first we focus on what has been promoted through scholarly review about how learning should be promoted in schools. To do this, we turn to the Organisation for Economic Co-operation and Development (OECD, 2010, 2013) and Hattie's (2012) large-scale literature reviews on student learning in schools. Though motivated by promoting economic growth through educated citizens, both these reviews point to certain themes that have the greatest positive effect on student learning with the key factor being the quality of teachers who are able to realize these themes. From this foundation, we then explore different types of teacher knowledge that we need to consider to create quality teachers.

INNOVATIVE LEARNING ENVIRONMENTS AND TEACHERS

Among the plethora of commentaries on learning and teaching, we have noted the pervasive impact of international documents such as *Innovative Learning Environments* (OECD, 2013), *The Nature of Learning* (OECD, 2010), and *Visible Learning for Teachers: Maximizing Impact on Learning* (Hattie, 2012). These reviews signpost the type of learning experiences those teachers from effective TE programs should be able to promote. The reasons for a close examination of OECD publications and Hattie's (2012) work are two-fold. Firstly, the publications are the result of meta-studies that summarize diverse research findings in the past decade and from around the world. Therefore, they are largely in a position to reflect a general picture of the recent developments in learning and teaching. Secondly, all of the publications directly address the issue of learning and teaching, though the OECD series focuses on learning and learners, while Hattie targets teaching and teachers. However, as will be shown

in the following analysis, both make a number of similar claims that point to themes in learning and teaching that have emerged over the past decade.

The OECD (2010, 2013) publications summarized the research results from its international study – Innovative Learning Environments (ILE), which was focused on innovative ways of organizing learning for young people with the view to positively influencing the contemporary education reform agenda. In regard to ILE, the researchers found that there is general consensus in the learning sciences that the context of learning matters and that learning is situated (Barab & Plucker, 2002; Lave & Wenger, 1991). The researchers' notion of "learning environments" referred to "an organic, holistic concept that embraces the learning taking place as well as the setting: an ecosystem of learning that includes the activity and outcomes of the learning" (OECD, 2013, p. 22).

In Hattie's (2012) *Visible Learning for Teachers*, a meta-analysis was used to examine large data sets so as to identify what matters in learning and teaching. Hattie highlighted the idea of "visible teaching" described as "when teachers see learning occurring or not occurring, they intervene in calculated and meaningful ways to alter the direction of learning to attain various shared, specific, and challenging goals" (p. 15). Additionally, he described "teachers as activators, as deliberate change agents, and as directors of learning" (p. 17); and "when teaching and learning are visible, there is a greater likelihood of students reaching higher levels of achievement" (p. 18). Hattie concluded, "enhancing teacher quality is one of the keys...[the] mind frame that leads to the greatest positive effect on student learning and achievement" (p. 167). Such a conclusion begs the question of what TE programs can do to enable such a disposition or mind frame.

A convergence of the publications generates a number of common themes on how to have the greatest positive effect on student learning to inform TE.

Theme 1: Learner-centeredness. The OECD publications and Hattie agree on the importance of a focus on the individual learner, knowing their prior knowledge, ways of thinking, motivation and emotion, as well as what appropriate challenges should be provided on an individual basis. In a word, they are unanimous in discarding the "one-size-fits-all" type of teaching and in advocating a more adaptive pattern of teaching.

Theme 2: Formative cycles among pedagogical components. Both stress a knowledge base for teachers so as to have an impact on student learning. Moreover, through pedagogical content knowledge[1] and resources, educators should develop a formative cycle of inquiry and redesign so as to create positive learning environments.

Theme 3: Learning and teaching are social. Both learners and teachers are encouraged to visibly communicate about their learning and teaching so as to be part of the knowledge construction process.

Theme 4: Assessment for learning. Assessment should be administered for the purpose of learning and teachers are encouraged to use formative assessment to enhance learning.

Theme 5: Connectedness in learning and teaching. There is the need for connectedness between ideas, subjects, and different learning organizations, e.g. schools, universities, and administration. Partnerships among these organizations are also encouraged.

What we have taken from the above summary of reviews is that innovative teacher education learning environments should parallel the type of learning advocated by these reviews. For example, for students becoming teachers, there is a need to focus on their "readiness" to learn and their ability to build strong social networks between peers and "mentor" teachers. Additionally, assessments made of them by instructors should focus on formative growth rather than summative ranking. Further, there needs to be structured connections between universities and schools, both formally within scheduled class time and informally via digital spaces and out of class activities.

CONCEPTUALIZING PROFESSIONAL LEARNING: TEACHER KNOWLEDGE FOR / AS / OF PROFESSIONAL PRACTICE

In this section, we explore professional learning for teachers. Teacher knowledge has been framed on the basis of two fundamental modes of thought — "narrative" and "paradigmatic" (Bruner, 1986; Munby, Russell, & Martin, 2001). Teacher knowledge relies on both modes; propositional and research findings contribute to paradigmatic deep thinking for professional knowledge that is then taught in university courses; narrative thought is cumulative and captured by each individual in the unique context of particular classrooms with anecdotes and stories often developed through practicum experiences. It is useful to consider narrative thinking as developing from: (1) personal knowledge, associated with beliefs and values from being taught and from experiences in the role of teacher (Darling-Hammond, 2006; Kagan, 1992); and (2) contextual knowledge about processes such as procedures and routines, assessment practices, materials and objects, cultural understanding and students, filtered by an individual's personal knowledge within the context of particular classrooms and schools (Korthagen, Loughran, & Russell, 2006; Lave & Wenger, 1991). The narrative mode comes to teachers naturally and can be developed through reflection, but paradigmatic thinking is less readily accessible. Initially developed in student TE and professional communities, it frames how to view, share, and understand professional practice by creating a set of assumptions and worldviews that permit what constitutes legitimate

knowledge (Munby et al., 2001; Putman & Borko, 2000). However, unless this paradigmatic deep knowing connects and is shaped by embedded professional practice, it can become distant, fragmented, and lacking coherent theoretical frameworks that make sense in practice (Hoban, 2002).

Paradigmatic teacher knowledge has been termed by Cochran-Smith and Lytle (1999) as "knowledge-for-practice." Early notions of teacher knowledge grew from this tradition and focused on models proposing that teacher knowledge was reflected in the difference in expertise in regards to knowing content and having experience applying it in practice. In particular, information-processing studies have focused on the cognitive processes teachers use in thinking about teaching with expert-novice studies focused on unravelling the knowledge structures of each respective group (Kagan, 1992). This research offered a positivist perspective on knowledge with much of the current understanding of teacher knowledge being built on the conception that knowing more leads to more effective practice. This type of knowledge-for-practice conception of teaching has contributed to the professional status of TE. The problem is that this formalized knowledge is distant from the practical knowledge of learning to teach, and as such feeds the teaching-as-telling default style of higher education (Finkel, 2000). Figure 1 represents how this knowledge-for-practice works as an external perspective on the "landscape of teaching practices" where researching that landscape then creates the paradigmatic accounts that are fed back to the teaching profession as content to be taken up to improve practice.
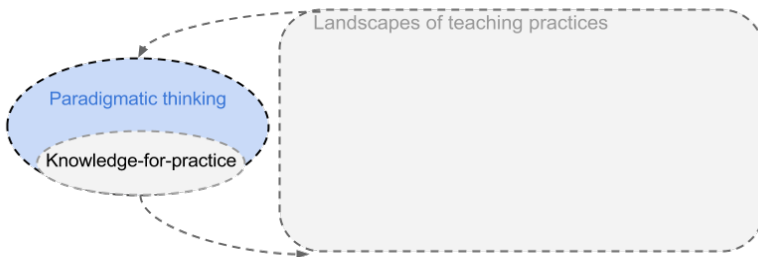

FIGURE 1. *Diagram of knowledge-for-practice focused on paradigmatic thinking*

In TE research, the shift in the 1990s was to more narrative thinking, moving from an emphasis on the teacher and what they know to the relationship between teacher, student, and content. Concepts such as pedagogical content knowledge (Shulman, 1986), practical knowledge (Munby et. al., 2001), and personal practical knowledge (Clandinin & Connelly, 2004) were developed. Studies focused on these concepts have explored how teachers invent knowledge-in-action and how they learn to make knowledge explicit through deliberation

and reflection. These studies considered both what teachers know about their subject matter and how that knowledge is translated into classroom curricular activities and then into pedagogical representations that connect with the prior knowledge and dispositions of the learner. Cochran-Smith and Lytle (1999) have termed this as "knowledge-as-practice." This body of knowledge has developed largely from a naturalistic mode of inquiry "as it is expressed or embedded in the artistry of practice, in teachers' reflections on practice, in teachers' practical inquiries, and/or in teachers' narrative accounts of practice" (Cochran-Smith & Lytle, 1999, p. 202).

In this approach, the focus is on how professional practice interacts with other constituent elements of a situation to produce the desired outcome. This represents a shift from the individualistic "acquisitional" metaphor to more situated and sociocultural views, with reflection in relation to professional knowledge and the messiness of "real" practice. Increasingly, professional learning is focused on a "'participational' metaphor for learning. These views emphasize the importance of environment, rules, tools and social relations; they show that knowing is always situated in activity and therefore is particular to settings and communities" (Fenwick & Nerland, 2014, pp. 2-3). Figure 2 captures the idea that narrative thinking, associated with knowledge-as-practice, is located in the landscapes of professional practice, emerging from the complex realities of professionals in the field.
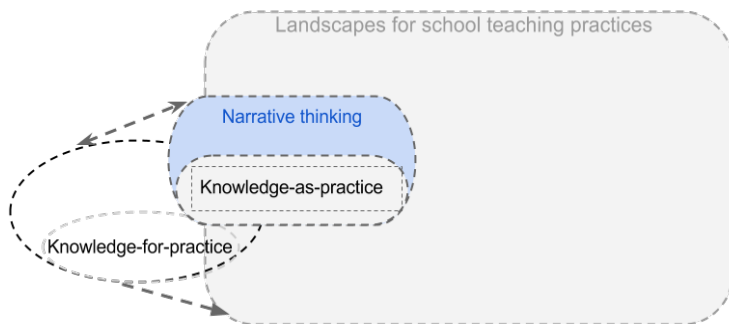

FIGURE 2. *Diagram of Knowledge-as-practice focused on narrative thinking*

This narrative thinking connects with paradigmatic thinking, especially as research validity is broadened to include more qualitative and critical perspectives on how we make claims to truth (Denzin & Lincoln, 2000). As research into professional practice integrates more naturalistic and post-structural views of social reality, knowledge-for-practice becomes enriched and developed with knowledge-as-practice conceptions of professional learning. In addition, land-

scapes of professional practices then include university teaching and learning practices as well as those associated with the field. For example, the expansion in the use of self-study as a method of researching teaching in higher education offers good examples of how knowledge-as-practice and knowledge-for-practice have come together in university communities (Clandinin & Connelly, 2004; Loughran, Hamilton, LaBoskey, & Russell, 2004).

A third body of knowledge on teacher learning is based on a collective, action research model for teacher learning (Carr & Kemmis, 1986). This body of knowledge focuses upon teacher learning as knowledge-of-practice (Cochran-Smith & Lytle, 1999). As such, the knowledge-of-practice conception does not separate formal and practical knowledge. In knowledge-of-practice, the assumption is that through inquiry, teachers across their professional careers make problematic their own knowledge and practice as well as the knowledge and practice of others (Loughran et al., 2004). Practice is more than practical. The knowledge that teachers need to teach well is more than what emanates from systematic inquiries. Knowledge-of-practice is constructed collectively within local and broader communities. In this view of teacher learning, teacher knowledge is not separate from the knower, but is constructed within his or her intellectual, social, and cultural contexts of teaching both in schools and in the university. Such a body of knowledge relies on a context of teaching practice where the problems of under-resourced situations, diverse student populations, and lives beyond the classroom are interwoven within the demands for student learning.
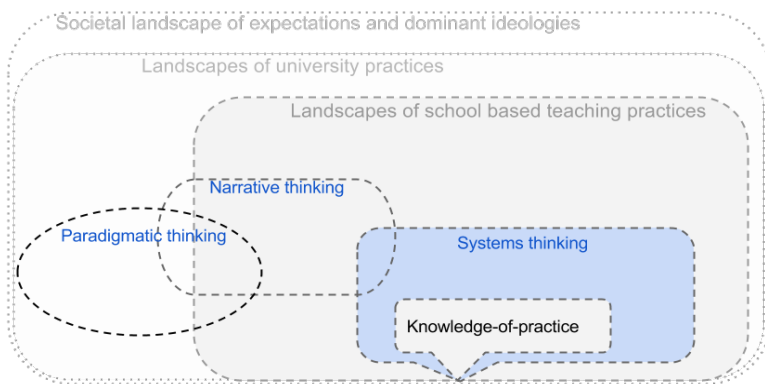

FIGURE 3. *Diagram of knowledge-of-practice focused on systems thinking*

Figure 3 represents how knowledge-of-practice promotes systems thinking. Here professional practices are located within affordances of the situation as well as the practical skills of the practitioner. Systems thinking encourages a broader perspective on practice as not universally defined but rather as a product of

practitioner, task, and environment interactions within nested systems of influence. For example, as noted by Conroy, Hulme, and Menter (2013), the increasing pressure from neo-liberal political agendas that advocate "deregulation and market-based solutions" (p. 588) to resourcing schools, hospitals, and community centres creates systemic pressures on professional practice. Such a mindset critiques the professional knowledge claims of a specialist's knowledge offered by university-based educators who, in turn, emphasize the complexity of professions and the role of university education as a public good (Darling-Hammond & Lieberman, 2012). As professionals, we have to navigate these constraints with a commitment to the benefits and purposes of our profession.

In the last decade, it has become clear that paradigmatic and narrative thinking need to be framed by systems thinking (Davis & Sumara, 2012; Hoban, 2002). A system here refers to a configuration of parts connected and joined together by a web of relationships. Systems thinking relates to processes of understanding how things, regarded as systems, influence one another within large nested systems. We have come to believe that a systems-based framework, grounded in complexity theory, offers a way of synthesizing paradigmatic and narrative learning by "focusing on the relationships between and among personal, social and contextual conditions for teacher learning" (Hoban, 2002, p. 65). Similarly, Fenwick and Nerland (2014) commented, in regards to all professional fields, that professional learning has become more located in inquiry about situated practice. That is, researchers in professional programs are "committed to analyzing the important role of materials and bodies as dynamic, fundamentally enmeshed with activity in everyday practices." This, combined with social forces associated with "symbols and meanings, desires and fears, politics and cultural discourses," means that both "material and social forces are mutually implicated in bringing forth everyday activities" (Fenwick & Nerland, 2014, p. 3). This knowledge-of-practice is therefore nested in systems or sub-systems networked together in complex relations that constrain and enable professional practice.

Figure 4 considers how separate but related ways of knowing practice can be integrated through the dynamic of professional practice. The knowledge of professional practice needs to be developed within communities of practice that intersect across boundaries of practice in the field, in the university and across community programs. Critically, research has to be infused into professional learning as a personal and contextual practice as well as part of a more formal process that generates knowledge-for-practice.
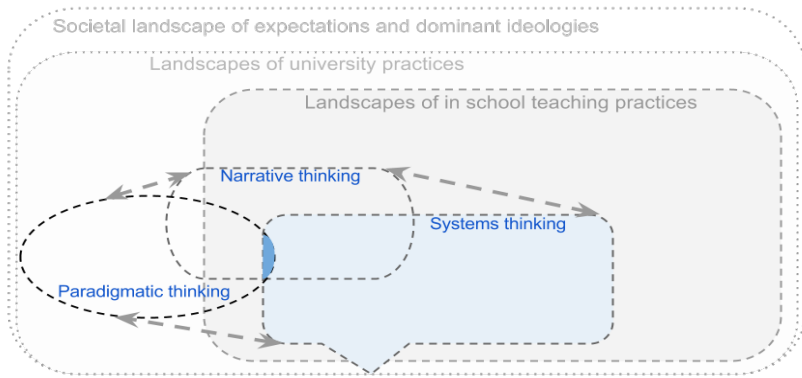
FIGURE 4. *Systems thinking and professional knowledge in the landscape of professional practices*

All three of these bodies of knowledge have informed our understanding of TE. However, some programs focus on a conventional process of knowing, learning, teaching, and assessing where knowledge is transmitted to students and mostly assessed through written tests, essay papers, and group projects. Table 1 summarizes the conventional approach with a focus on cognitive science notions of information processes for learning. The integrated approach has always existed in TE programs through "experiential" based practicum; however, this ignores the separation of roles from being a student at university and then a teacher in the school (Lave & Wenger, 1991). With an integrated approach, the idea is that student teachers and instructors can co-exist in both university and schools as practices advocated by conventional wisdom are adapted and modelled in context (Hopper & Sanford, 2008), and that learning to be a teacher emerges from becoming a "student of teaching" (Dewey, 1904, p. 15). Assessment then becomes a reflection on a student's forming teaching identity and practice in context where knowledge from the "core" content becomes connected to the messiness and challenges of working with students in school systems. The final column in Table 1 focuses on the knowledge-of-practice and builds on the previous two columns. The networked knowing relies on teachers being connected to other practitioners and colleagues through an array of participatory technologies (Hoban, 2002). Here, insights on teaching practice would be shared in learning communities through narrative, rich media, sharing of resources, and linking to big ideas related to education freely available on the Internet. In networked knowing, insights on how to navigate the constraints of systems would frame exchanges as teachers were attracted to ideas that addressed problems they have encountered or if they offered new ways to develop existing practices.

TABLE 1. *Dimensions of education programs and teacher knowledge*

Dimension	Conventional "Core Content"	Integrated "Experiential"	Networked "Participatory"
Knowing	Established knowledge	In relation to field experiences	Adapting and connecting in communities of practice
Learning	Information processing. Content and testing	Situated learning Distributed cognition Role and reflection	Complex emergence Transforming interactions person-activity-environment
Teaching	Lecture, group work	Modeling & adapting in context	Collaboration, and shared interests
Assessment	Reproduce knowledge. Exams and tests	Student reflect on practice in context	Collect and share authentic artifacts with and valued by mentors and peers

This networked "participatory" way of developing teacher knowledge resonates with the complexivist approach to educational change focused on the interactions between agents of system with the affordances of the environment that allows the a complex learning system to emerge (Davis & Sumara, 2005; Hoban, 2002). This has led us to explore the use of electronic portfolios as a vehicle to map student development (Hopper, Sanford, & Bonsor-Kurki, 2012), to enable program renewal (Hopper & Sanford, 2010) and to form a professional hub, an extended memory for the forming teacher shared with a web of peers (Hopper, Sanford, Fu, & Monk, 2016; Sanford et al., 2015). As advocated by Hoban (2002), the networked professional then becomes the intelligent agent of a self-organizing system of teacher practices as they are able to carry information about themselves from actions towards intended actions in the pursuit of quality teaching.

In the next section, we share a review on how digital electronic-portfolios (ePs) have been used as a vehicle to better integrate theoretical and practical understandings of learning and teaching as novice professionals learn to think from narrative, paradigmatic, and systems perspectives. The final section then outlines a TE program we have conceptualized and implemented in order to more clearly integrate deep conceptual understandings of education with cumulative narratives of education in practice. Our intent is to generate more transformative learning experiences for students in professional programs as they learn to navigate the complex realities of professional practice.

EPORTFOLIOS AS CONNECTIVE TISSUE IN A PROFESSIONAL PROGRAM

For the past eight years we have been using eP in TE programs (Hopper et al., 2012). Our literature review on ePs generally distinguished three types of eP: (1) learning or developmental; (2) assessment for credential; and (3) showcase of best work; other scholars have made similar observations (Abrami & Barrett, 2005; Karsenti, Dumouchel, & Collin, 2014). For this paper, we are interested

in the context of eP use that has gone beyond showcasing and documentation, but rather as a learning tool and the "connective tissue" in teacher education (Russell & Martin, 2016).

Conceiving eP as a learning tool has been noted by other scholars. Johnsen (2012) found that eP made learning visible by enabling students to express their learning. Other scholars have used eP as a learning strategy (Lin, 2008), a scaffold for students' learning (Masters, 2013), and a personal developmental learning tool or transformational learning process through reflection (Lopez-Fernandes & Rodriguez-Illera, 2009).

Other scholars have focused on using eP to create a learning community. Hughes and Purnell (2008) explored the sharing function of eP to create a community of practice for pre-service teachers. Ehiyazaryan-White (2012) examined the dialogic potential of eP in formative peer-to-peer and instructor feedback and claimed that eP can be used to create communities of learning and achieve learner-centered pedagogy.

Still other scholars framed eP as a more complex phenomenon where its multiple functions should be viewed within a holistic system. Some of them have also made some efforts to visually map the eP process. Wakimoto and Lewis (2014) discovered that students valued eP for its multiple functions, be it a form of summative assessment, a developmental tool for professional competences, an opportunity to gain technology skills, or a means to build communities of practice through peer-to-peer interaction.

Reflecting on the literature and our own research (Hopper et al., 2016), we have defined an eP process as a form of authentic assessment process that integrates both the summative and formative modes of assessment. It utilises peer feedback in relation to co-constructed criteria around professional competencies and self-assessment through reflection on how students have learned what they have learned. The eP process connects both the personal and professional identities of students with their evolving professional learning communities.

BLUEPRINT FOR PROGRAM RESIGN: A FORMING INITIATIVE

What, then, does a program of TE look like if the features above are taken into consideration? Recognizing that the innovative organizations of learning include acknowledgement of situated and contextual elements, the Transformation Teacher Education (TRUVIC) program has sought to create in one term a program that is holistic, interconnected, and located across learning contexts (campus, schools, community), addressing issues of fragmentation that continue to exist in contemporary TE programs. To help the courses self-organize (ie. to form around certain principles), they are structured around Indigenous teaching and learning principles, where teacher candidates (TCs) are asked to (1) put the learning of their peers before their own, (2) consider how their work supports learners for the next seven generations, and (3) use their passions to ignite the potential of the entire community (Hopper, 2015).

Instructors work collaboratively throughout the term to connect six courses and requisite assignments, creating activities that enable identity formation / exploration, connect campus and school (eP, inquiry projects), are common to multiple courses (multidisciplinary unit plans), are cyclical (i.e., peer teaching sequences), demonstrate multiple perspectives, interweave Indigenous principles, and are collaborative rather than competitive with contract grading practices (Hopper et al., 2012). In some cases, the instructors collaborate, and in others, they acknowledge and integrate the learning experiences of each of the courses (e.g., developmental stages of learning with planning activities, educational technology that supports learning activities and pedagogies).

The program consists of a pedagogical core (learner experience and knowledge, curricular knowledge and skills, pedagogical knowledge and expertise of educators in dialogue with each other — knowledge-for-teaching) that informs and is informed by ongoing adaptation (formative cycles) in deep and meaningful partnerships among educators, learners, and ideas (knowledge-of-teaching). Ongoing dialogue, as well as identification of artifacts representing deep and cumulative learning and reflection on the interconnection of these artifacts in context (discussed in next section — knowledge-as-teaching), enables learning and teaching to become visible in a way that it can be described and adapted by teachers as activators and agents of change to their practice, understanding and the system as a whole. The artifacts, collected for ongoing consideration in digital electronic portfolios, create conditions for narratives to shape and connect with the deep learning, considering self in community.

The TRUVIC program was developed in an attempt to coherently address the needs and interests of the TCs as they begin their 16-month program. We have previously described this program using a complexivist lens (Sanford et al., 2015), focusing on the relational pedagogy that developed between the students, their instructors, the school, and the content knowledge. Recognizing that learning is cyclical, social, and interconnected in multiple complex ways, we have worked to create a coherent and connected set of experiences that are both deep (paradigmatic) and cumulative (narrative). Within this program, the creation of a digital portfolio provides a space for TCs to demonstrate evidence of their learning in the program as well as their prior educational experiences. Both the eP and the contract grading approach see assessment as part of the learning process, support growth and development, identify areas where attention is needed, facilitate collaboration and make learning visible. The courses and field experiences emphasize professional identity creation, building of a learning community, and deep understanding of the complex phenomenon of learning to teach.

TCs begin their program with a day-long (dis)orientation consisting of re-connecting them to place, to each other, and to self as they get to know colleagues and instructors (participating in three workshops: team-building activities, visiting Mystic Vale[2], and developing professional identity). Unless the TCs have an opportunity to examine their prior educational experiences,

which have been largely transmission approaches, with delivery of information and testing content recall, to reconsider ways in which children and adolescents need to be engaged, and to have alternative approaches modelled for them, they will not readily adopt learning-centred pedagogies.

The pivotal course in the TRUVIC program is the teaching seminar, taught by practicing teachers who both structured the one-day-a-week school visits — enabling TCs to experience a range of classrooms, teaching strategies and disciplinary approaches — and provided spaces to debrief their observations. This day was introduced with focused provocations (e.g., attention to disengaged students, classroom organization, teacher / student relationships, etc.) and concluded with an exploration and debrief of the provocations set in the morning. Instructors of campus-based courses also visited the school, enabling their courses to connect to the reality of 21st century high schools, adolescents, and teachers. Campus-based instructors also connected to school-based instructors / seminar instructors through regular conversations and meetings, visits to schools, community debrief meetings throughout term with the TCs, and informal sharing of stories, questions, and ideas.

In the TRUVIC program, we have identified four aspects to the re-imagined professional learning cycle as described in Figure 4. These are: (1) connecting TC narrative; (2) assessment as learning to enable systems thinking; (3) creating community in local and global landscapes; and (4) using digital ePortfolios as a connector across courses.

Connecting TC narratives: The experiences in the courses generated connecting TC narratives (created between school visits and prior experiences) with paradigmatic knowledge (created on campus) to create interconnected horizontal and vertical weaving of the theoretical with the practical, through:

a. being in schools one full day / week from beginning of program

b. working with teachers in schools and with children / youth; engaging in guided observations scaffolded to increased participation with individual and groups of students

c. opportunities for hearing multiple voices / perspectives interconnecting district superintendent, school counsellor, and former TCs

d. creation of an interdisciplinary unit plan — interweaving disciplinary perspectives and ways of knowing (example unit themes include: understanding First Nations communities through long house building; hydroelectric dams in BC; the lenses of the holocaust: an exploration of point of view; food as a source of life and culture; explaining the *Aurora*, a natural and spiritual phenomenon) — in each case distinct disciplinary backgrounds are combined to create new thinking, e.g. physics / visual art / biology, social studies / trades (carpentry) / Indigenous knowing, English / biology / social studies.

Assessment as learning to enable systems thinking: In this aspect of the TRUVIC program, TCs were enabled to contrast how they understood assessment as a competitive grading system, where they did work to get marks in the currency of university grades, to assessment based on their learning that was encouraged and enabled through peer and instructor feedback. The following three insights emerged for the TCs.

a. creating an alternative grading structure that supports collaboration, risk-taking, sharing, connecting — using a contract grading approach in which TCs are expected to meet professional standards in all of their work and can enrich their work with extension projects (integrates Indigenous principles underpinning the program)

b. digital eP creation — enables TCs to collect artifacts, reflect on the significance of their selected artifacts for their learning, and connect learning from one site (course, field experience, community location) to others

c. deconstructing / reconstructing — spaces of discomfort in safe spaces, enabling the unlearning of prior schooling experiences and re-connecting with needs of learners, re-thinking the role of teacher in relation to learners, rethinking what is valuable and connecting present experiences to past (previous work, family, educational experiences).

Creating community in local and global landscapes: The cohort model for the program generated close connection between TCs as they worked together to address the complexities of becoming a teacher. In addition, relocating the seminar course in different schools and with campus-based instructors from courses in the TRUVIC program visiting the schools, we nurtured a backdrop to study the reality of teaching whilst maintaining a vision of what teaching could be in schools.

a. from the first (dis)orientation day, creating spaces in which TCs can develop and recognize the importance of meaningful relationships, with their peers, instructors, teachers and students, as well as with themselves and their own past experiences

b. through multiple regular encounters between TCs and instructors in both formal in-class and informal spaces, having opportunities to query the relevance of course material, ask questions, share their concerns and their trepidations

c. engaging in professional conversations and opportunities — with instructors, teachers, district-level administrators, and members of Ministry of Education.

Using digital ePortfolios as a connector across courses: Throughout the term, using digital ePs as the connector to supporting professional learning and professional practice led to a real sense of shared teacher knowledge that promoted a sense of professional pride and accomplishment within a common commitment to become a worthwhile teacher as noted below.

a. shaping a professional identity; creating a *Who am I?* 90-second video, to interrogate their own backgrounds and share with others — this assignment as well as other spaces and conversations enables the valuing of their own experiences and helps them support each other to take risks in safe places; the TCs learned to connect to their personal selves while shaping their professional identities

b. using digital media, TCs create a "case study" of an adolescent they have met at the school, learning how to better connect with and talk with their future students; these case studies are shared with each other and located in their ePs — they come to see adolescents "at the back of the room," "under the bleachers performing hip hop" or "in the hallways" (sample case study titles). This experience also helps to connect their past selves to current adolescents and feed their forming knowledge-as-practice.

c. connecting campus and school contexts through selected artifacts gathered on visits to schools and classrooms, debriefing experiences on campus; TCs begin to see through the stereotypes and myths of "adolescence" and recognize individual students in all of their complexity; they also recognize the significance of contextual factors that are unique to each student, classroom, school, and community, interpreting knowledge-for-practice within the real narratives of the students in the school they visit.

d. connecting their artifacts of learning in individual courses to each other by way of including them in their digital ePs — as word documents, videos, images, powerpoint or Prezi presentations, etc., forming a powerful source of knowledge-of-practice to share in their forming networked communities.

At the beginning of the term, the intentions shaped in the TRUVIC program were often difficult for many TCs to accept. Early in the term, one TC commented that some of the ideas that were presented were really interesting, but he had no idea how these would be useful to him as a biology teacher. "I know how biology teaching works," he stated. "Students get assigned chapters from the text, attend the lecture, learn the material, and then they write a test." The collaborative learning, multimodal texts and materials, or alternative grading practices that were so alien to his school and university experiences puzzled him. Another TC said, "teachers do not work in interdisciplinary ways. I want to learn how to teach physics." Again, his experience was not compatible with these types of experiences being given to him in the program. Another TC was terrified by the prospect of visiting schools and classrooms, wanting to defer the experience as long as possible as she was not confident that she could effectively address adolescents and their needs. "I'm not ready," she commented.

However, as the TCs moved through the program, forging strong relationships with each other, with their instructors and with adolescents, they came to "lean into" their role as teachers in more confident ways. Through the development of their digital ePs, they began to see their professional learning growing and developing. For example, over the term, the puzzled biology TC who initially advocated discipline-based teaching shifted his thinking, embracing a more project-based approach to teaching biology as he engaged in one high school's Institute for Global Solutions program that combined social studies, English, global studies, and science.

INSIGHTS FROM THE STUDENTS ON THEIR LEARNING AND THE EP PROCESS

To give some insights on this program, we offer extracts from TCs at the end of the term, after course requirements and grading were completed. From a possible group of 70 TCs, 36 completed an ethics consent form and volunteered to be questioned about their learning experiences as reflected in the eP process. All TCs completed an exit interview with a peer and an instructor at the end of the term on their eP as part of course requirements. Following their exit interviews, the volunteers were asked about their impressions of their learning experiences. All the responses were transcribed, categorized, and then cross-referenced with three researchers to confirm a degree of agreement on how each category seemed to offer insights on TCs' experiences. In response to how the interview went, here are representative insights.

Change perspectives on teaching

Changing perspectives on teaching was a common theme for TCs as expressed by these two comments:

> Being in cohorts and working with others and working with mentors as well, and participating in a community has really helped break down some of the ideas and notions we had about what it meant to be an educator. And also through transformational learning and a safe community environment, we were able to reimagine and reconceptualise what an educator is in 21st century world.

> It did show how I've changed, and my perspectives on teaching have changed. I changed mostly based on artefacts from other places — videos, podcasts, other people's blogs that I have read both before this term and over this term that have completely changed my perspectives on teaching.

Though this idea of change was common for all TCs, some commented on how their change coincided with changes they were seeing in high school students over the term. As one TC commented,

> I think it [TRUVIC experience] makes it feel so much more realistic. Reflecting on it, I can actually use this activity in a lesson that I am going to do, or with my multiliteracies autoethnography that I did, I thought that has

> impacted me in this exact moment with a student, when I was connecting with him, so I think that it [TRUVIC] allows it to be everything, and so all encompassing and that is going to influence me as a teacher.

This ability to link experiences in the university class to experiences with high school student allowed TCs to shift their thinking from being a student to thinking as a student and as a teacher, and to reflect on their shifting role.

Networking

At the end of the term, the TCs shared their ePs in an exit interview with one or two of their peers and an experienced teacher. These exit interviews represented the completion of the course requirements for the term and formed: (1) a celebration of what they had learned; (2) a network between the TCs and the experienced teachers; and (3) the formation of the TC's connections to the teaching profession. As one TC stated,

> Having 3 portfolios laid out side-by-side is [a] really great way to see how we have the same experiences and where they were different...and that just really helped to bring together the benefits of an interdisciplinary approach to really whatever we are talking about, whether it was video games as a learning tool, or the sciences and the perspectives that people have on it in education, or the profundity of community and what that can do for people. Just seeing all of our different but...same portfolios and having all of our similar but unique perspectives creates something new.

The eP allowed TCs to share and make connections. The opportunity to select what they valued from their course experiences and from the experiences coming into the program allowed them to build a sense of their forming content knowledge for teaching simultaneously with their peers. Though TCs shared common experiences, what emerged in their ePs was unique but linked through a common commitment to a professional learning community.

Identity and recall

The quotes below captured how the TCs developed a sense of being a teacher, by exploring who they were as an educator with the ability to capture those experiences in the eP, and the ability to connect what was being learned at the university to this forming identity.

> My self-confidence has really grown this semester. Coming into the program, I wasn't sure what kind of teacher I would be...a good teacher, I hope, but at the end of it, I am feeling really confident that I will be a successful teacher, and I'm really passionate about doing it and going into it and feeling inspired from the things that I learned this semester. I really want to take what I've learned and put it into practice.

> One of the things that I got [out of the experience] was to be able to talk about some of the things we have done this semester...so talking about what I could be using going forward as an educator, and it was great to explore what we have done this semester and how much we have learned about ourselves as educators and as future teachers.

> It was good to look back and see what I had come in with and thoughts that I had at the time and just, kind of, where I am at this point and how I have grown. It was pretty good to look around and see the knowledge I built up over the semester.

This ability to pull things together from across multiple courses gave the TCs as a group a sense of being part of a whole as they recognized how all the bits they had done over the term connected and interacted. The ability to recall parts of life that structured their thinking as prospective teachers enabled them to connect their life experiences to their forming teacher identity:

> I included my autoethnography which went through the texts which have influenced me from grade 4 until now, and how that related to me being a teacher...so I thought that really helped me think about my life and teaching together, which I had not really thought about before this.

CONCLUSION

The TRUVIC program actively focuses on creating conditions and pedagogical spaces that afford opportunities to transform TCs from being "students" to TCs who are thinking, observing, and acting like teachers. The idea of change, even for the more traditionalist students, made sense as they integrated school and university learning experiences. The "participatory" nature of the learning experience, across the courses in the term, encouraged TCs to network, to share and to support each other. Instructors collaborated on assignments, on field experiences, and even visited each other's classes and schools, valuing the learning experience of becoming a teacher in deeply rich and emergent ways.

There were challenges associated with learning to use digital technology, getting all course instructors to learn how to work together or dealing with TCs who became anxious that they were not learning enough "stuff" in a traditional "fill me up with information" process of learning. Indeed, one or two courses each term in the program were still focused on covering content and using tests to ensure TCs read course material; however, the contrasting experience in the TRUVIC cluster of courses meant that TCs came to appreciate the collective self-organizing, adaptive, and emergent form of learning that was being modelled. As was noted in Sanford et al. (2015), the TRUVIC students formed a collective consciousness that observed, became comfortable in a school (in different pedagogical spaces), got to know adolescent students, then volunteered to teach as they saw how they could contribute to the school teachers' lessons. This process shifted how students as a cohort and their instructors as a collective described the world of teaching, as they learned to teach with a relational epistemology, interact with adolescents and bring forth the knowledge of being a teacher from different pedagogical spaces.

We feel that the TRUVIC model offers us hope of how to grow our program, in collaboration with the learning intents of the schools we work with, but most of all in a network way with students – current, past, and future – as we nurture the connective tissue of being a teacher.

NOTES

1. Pedagogical content knowledge refers to the ability of teachers to interpret and transform subject-matter knowledge into the context of learning in order to facilitate student learning (Shulman, 1986).

2. Mystic Vale comprises a steep-sided gully in the university campus and is part of the Straits Coast Salish peoples' traditional homeland. For thousands of years, Mystic Vale was utilized for harvesting plants, hunting, and fishing.

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