Celtic knots: Interweaving the elements of effective teacher professional development in ICT

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ABSTRACT

Professional development for teachers is often described as a journey. This paper, using the findings from a small-scale study interrogating professional development in ICT, offers the alternate metaphor of an interwoven Celtic knot to explain this phenomenon. It will show how the four key elements identified as being critical to creating the most conducive conditions for effective professional development are interdependent parts of a whole. This 'whole' is here represented as an iterative loop with theory and practice as its diametric but connected opposites. The connections between these opposites encompass the four elements in a dynamic process. Like a Celtic knot, there is no defined beginning or end nor do these elements work in a straight line. This paper attempts to show the inherent dynamism and interdependence of these elements and argues for professional development for teachers which consider both theory and practice. The understandings from this dynamic model underpin the published position statement of QSITE (Queensland Society for Information Technology in Education).

Professional development of teachers is frequently likened to a metaphorical journey (DEST, 2004; McKenzie, 2001). While this is an attractive and superficially convincing metaphor, this paper will alternately suggest, on the basis of findings from a small scale study conducted in 2004-2005 (Lloyd, Cochrane & Beames, 2005a, 2005b), that teacher professional development in information and communication technology (ICT) is less of a journey with a predetermined starting and finishing point than it is of an iterative loop. If represented visually, it might look more like a Celtic knot (see Figure 1) than the straight line of a continuous journey moving from one point to another.

Figure 1: Celtic knot

What is most interesting about the iterative form of the Celtic knot is that its complexity is based on simplicity as its repeating simple graphic elements weave a new and intricate whole. It is, in fact, the dynamic process of intersection and interweaving which creates the illusion of complexity.

Similarly, the 'professional development' loop to be described in this paper and to be likened to a Celtic knot begins as a simple oval with *theory* and *practice* as diametric opposites which are joined by arcs marked with directional arrows (see Figure 2). Here 'theory' is understood to incorporate personal philosophy, educational tenets and systemic policies and goals and the linear connection between it and practice is intended to represent a praxis in which theory informs practice and practice informs theory in reflexive and constructivist ways.
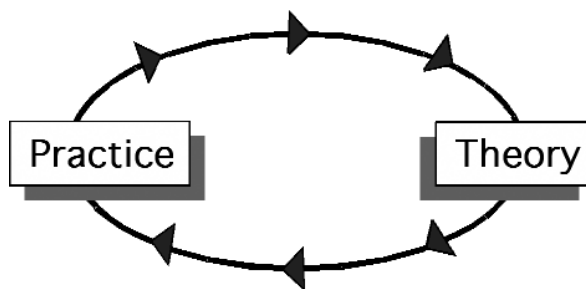

Figure 2: Iterative loop model of professional development

The reflexivity of Figure 2 is implicit in Nespor's (1987) view that a change in teachers' practice is coupled with a gradual 'replacement' of beliefs and Windschitl's (2002) description of transformative professional development which involves:

(a) interrogating one's own practice and the practices of others;

(b) making assumptions explicit; and,

(c) making classrooms sites for inquiry.

When effective, professional development fosters fundamental changes in deeply held beliefs, knowledge, and habits of practice. It is seemingly insufficient to affect one without affecting the other, that is, deep changes to practice do not occur without parallel changes in a teacher's theory or philosophy. This idea is well-supported by the literature relating to self-efficacy of teachers and the

role of beliefs in teaching practice (see, for example, Albion, 1999; Albion & Ertmer, 2002; Bandura, 1997; Dwyer, Ringstaff, & Sandholtz, 1990).

Guskey (1986) wrestled with the fundamental question of whether teacher practice followed belief, or vice versa. Representing theory and practice as iterative elements (as in Figure 2) responds to this 'chicken and egg' conundrum but does not attempt to explain it. What will be conjectured here, however, is that the more interwoven the connections between practice and theory, arguably the richer the experience of being a teacher. If at one end of the spectrum, there is little or no connection, then teaching is reduced to a craft rather than the 'art' which is embedded in both the connotative and denotative meaning of 'pedagogy.' It is further contended in this paper that the role of effective professional development is to offer or establish multiple pathways between these diametric but interdependent entities.

The 2004-2005 study used as the stimulus for this paper was conducted in Queensland on behalf of QSITE (Queensland Society for Information Technology in Education) which is a state professional computer education association. The main aim of the study was to inform the association's position statement on the professional development of teachers in ICT. The full report of the study (Lloyd, Cochrane & Beames, 2005) can be found on the QSITE netsite. The study will be referred to in this paper as the QSITE study.

Four elements of ICT professional development emerged from the QSITE study. These were (a) context, (b) time, (c) community, and (d) personal growth (see Figure 3). These elements are consistent with the extant literature but no instance was found where all four had been identified. What is important in the reconceptualisation of the underpinning metaphor of ICT professional development contended in this paper is that, while each element can be seen as a discrete element, it quite clearly remains as an interdependent part of a whole. Figure 3 presents the four elements with explanatory annotations.

Context

Context refers to the practice of teaching and learning and can be described in terms of *relevance* and *immediacy*.

Time

Time has multiple senses, but generally has a dual definition. These are:

1. *time* as a measure, that is, duration and frequency, expressed as needing to be prolonged, ongoing, sustained, as well as the partition of time within professional development events, extension beyond event, and the issues related to time release;

2. *time* as a variable of sequence or need, that is its timeliness or being 'just-in-time.'

Community

Community refers to collaborations during and following the professional development event and to ongoing connections and professional collaborations within local and extended communities.

Personal Growth

Personal growth refers to the cognitive challenges as well as the maintenance of 'corporate' knowledge, for example, in regard to new or altered curriculum and administrative processes.

Figure 3: Elements of ICT Professional Development

Based on responses from informants to the QSITE study, these elements can be qualified as follows:

1. To satisfy the element of *context*, ICT professional development must:
   - be relevant (authentic, local and real)
   - be meaningful
   - be practical
   - meet immediate needs (direct impact)
   - meet ongoing needs (sustained impact)

2. To satisfy the dual understandings of *time*, ICT professional development should:
   - be timely (just-in-time)
   - be sustained (over time)
   - provide adequate time for participation, reflection and implementation
   - allow teachers to take responsibility for their own learning

3. To satisfy the *community* element, ICT professional development should:
   - encourage sharing with others, hearing other stories from the field
   - provide ongoing support and heightened collaboration
   - expand professional and personal networks

4. To satisfy the *personal growth* element, ICT professional development should:
   - add to personal knowledge
   - increase personal skills
   - enhance status (within learning community)
   - take account of teachers' prior knowledge, different levels and learning styles
   - enable reflection
   - allow personal selection

In summary, the following statement in regard to ICT professional development was offered as part of the QSITE position statement:

Effective professional development has to immerse an individual in his or her *community*, directly address the *context* of teaching and learning, add to *personal growth*, and be both 'over' time and 'in' *time*. These elements are to be viewed as being the stepping-stones between practice and theory. (emphasis added)

As noted, the identified and qualified elements of context, time, community and personal growth are variously and individually seen in the literature surrounding professional development but are not typically shown as being interdependent. What was particularly interesting about the findings of the QSITE study is that they showed these elements in action, or rather as the components of a dynamic whole. Figure 4 shows these elements in balance and 'in motion.' The Celtic knot has achieved its simple symmetrical balance despite the complexity of its intertwining of elements.

process of building and reinforcing connections between theory and practice. A teacher will, consciously or unconsciously, engage with this process through his or her entire professional life.

2. The element of time is shown in its two forms – 'over' time (sustained) and 'just in time' (timely) – comprising the outer circumference of the model and replacing the simpler directional arrows of Figure 2. The movement from practice to theory is seen as being the slower more reflective process of moving from practice to theory, that is, of being 'over time' or sustained. Opposing this, the movement from theory to practice is seen as being faster, that is, of being 'just in time' or timely. It is this erratic cycle which sets the model in motion.

3. The element of context (with its dual requirements for relevance and immediacy) sits in the 'practice' hemisphere.

4. The element of personal growth (with its dual requirements for cognitive challenge and operational information) sits in the 'theory' hemisphere.
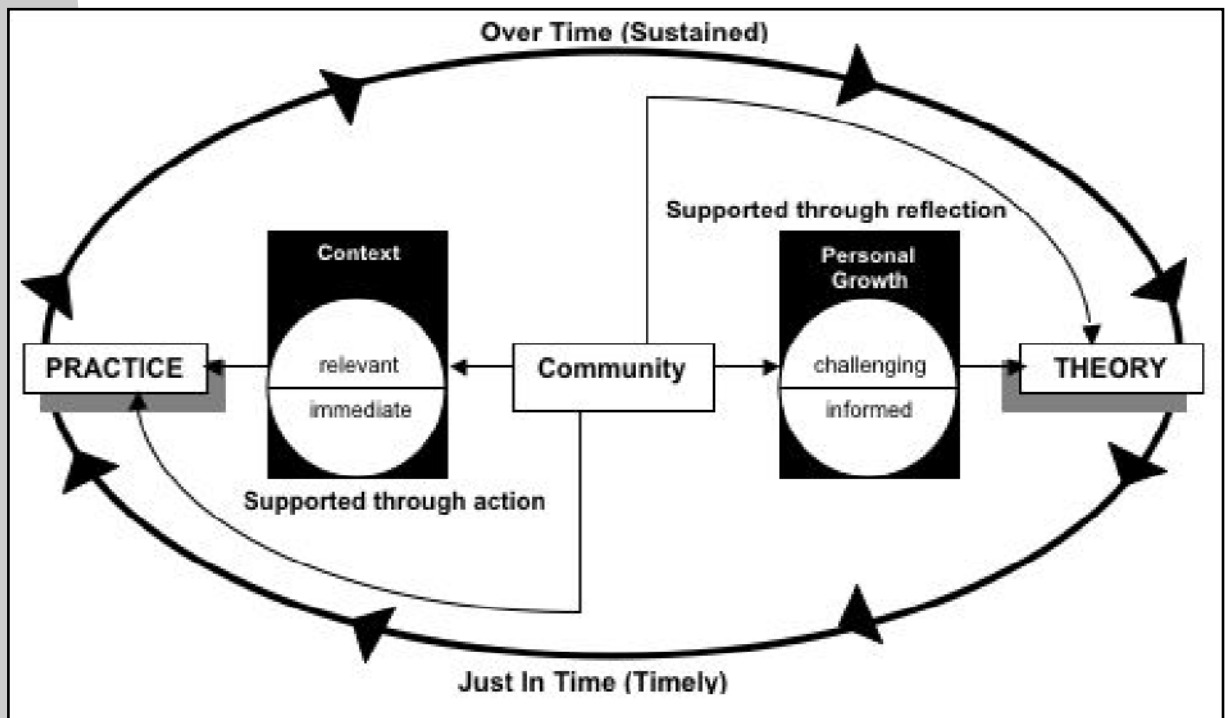

Figure 4: Complex and dynamic iterative model of professional development

The complex and dynamic iterative model presented in Figure 4 is, as with its simpler precursor presented in Figure 2, concerned with the interrelationship and reflexivity of theory and practice and how, as previously noted, each informs the other to form a praxis. They remain as diametric but connected opposites in the professional development process.

The interactions within the model are best described as a series of declarative sentences.

1. professional development is a reflexive

5. The element of community sits in the centre and acts as a pivot – or arguably more like a router in a computer network or a roundabout in a road network. In this, (a) theory is suffused into practice through action with the community scaffolding and supporting change; and (b) practice reinforces theory through reflection within the community.

Figure 4 attempts to show that effective professional development for teachers in ICT is a dynamic rather than static process and offers a visual representation of the metatheory which supports this contention. The 'best' or

most effective ICT professional development is that which fits the rhythms and momentum of this interaction. Where ICT professional development is ineffective, it is where (a) individual elements are not satisfied, or (b) where the connections, particularly those which pass 'through' the element of community are not formed.

The QSITE position statement which was derived from the QSITE study referred to this paper includes the following key principles:

1. Professional development must support teachers' lifelong learning through reflection (practice to theory).

2. Professional development must improve teaching practice through action (theory to practice).

3. Professional development should foster active membership and collegiate relationships within professional communities.

4. Professional development should consider the need for timeliness and reflection over time for practising teachers.

These, quite simply but not simplistically, reflect the necessary attention to elements as discrete entities but also to the essential connections between them. The iterative looping model – with the Celtic knot as its metaphor – pays heed to both the elements and their connections. This may, in fact, still represent a journey but one, in constructivist terms, has no beginning and no end – we keep learning and have never been at a point where we know nothing. It is dynamic and may truly represent the Buddhist notion that 'how' we travel is more important than arriving at our destination.

BIOGRAPHY

DR MARGARET LLOYD *is a Senior Lecturer in the Faculty of Education, QUT. While she lectures in a number of areas in computer education, she has specific responsibility for secondary computing curriculum studies. She is on the State Review Panel for Information Processing and Technology and is a member of the Queensland Studies Authority's P-12 Technologies Committee. She was part of the writing team of the Information and Communication Technology Education (ICTE) syllabus and has co-authored an ICT textbook for junior secondary students. Her current research interests include the history and politics of computer education, the measurement of integration of ICT in the classroom, and the definition of effective professional development for teachers.*

JANET COCHRANE *is currently a Regional Technology manager for Education Queensland. Prior to this she was the Coordinator of the Learning Development Centre - ICT at Hervey Bay. She is a member of the QSITE executive committee as well as current president of the Joint Council of Queensland Teacher Associations. She is passionate about ensuring teachers receive the best possible professional development opportunities in ICT in order to plan and implement rich and engaging learning experiences for students.*

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