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Wrestling with complexity: The work of teacher educators in uncertain times

Frances Rust
New York University

In the J. Paul Getty Museum in Malibu, California, there is an amphora on which a Greek artist in ancient times depicted Hercules' second labor, Slaying the Lernean Hydra. In the legend of Hercules, the hydra was depicted as an enormously complicated creature who, despite Hercules' best efforts at lopping them off, could continue regenerating its heads and, at the same time, trap his assailant. Had Hercules not had help from Iolaus, there would be no story of Hercules and his many labors. The Hydra would have stopped him!

In many ways, the story of Hercules and the Hydra provides a relatively simple example of a complex system within the even more complex one of Hercules' Seven Labors, and, as such, it seems an apt analogy for the complex system of teacher education. However, systems thinking is relatively rare in the education field (Banathy, 1991; Betts, 1992; Senge, 2006) and virtually absent in considerations of the field of teacher education except as applied to the teaching of preservice teachers to shape curriculum (Wiggins & McTighe, 1998). Why this may be could have something to do with the commonplace understandings of education and teacher education that have emerged with the rise of universal education in the United States and around the world. Old regimens seem not to be working. As Betts (1992) writes,

The seeds of public education's current failures are found in its success in the past. From its inception, public education has been called on to transmit core knowledge and cultural values, provide custodial care, and prepare students for life after school, the most important aspect of which is critical and creative thinking for problem solving and decision making. Public education has been very successful in its first function, generally successful in the second, and much less successful in the last. As a consequence, public education has emerged as one of the prime sources of stability, or pattern maintenance, in our society. Public education's overwhelming success as a pattern maintenance institution is at the heart of its failure to match changing societal expectations. (p. 38)

Given the increasingly extreme criticism of public education over the past twenty years and the concurrent critique of teacher education that has emerged along with it, now

seems an appropriate moment to consider what systems theory as it relates to complexity might offer to those who are trying to imagine or are in the throes of implementing new approaches in these fields.

Systems Theory and Complexity

A *system* is a set of elements that function as a whole to achieve a common purpose (Betts, p. 31). For the purposes of this article, one might consider teacher education an element of the larger system of education but, as complexity theory would have us understand, teacher education is itself a system that exists in a dynamic relationship with the larger system of education. It is a part or element of the larger system, “a necessary but not self-sufficient component of a system. That is, the system cannot achieve its purpose without the element, and the element by itself cannot replicate the system's functions” (Betts, p. 39). The relationship between the two systems is continually changing as they seek equilibrium in their own spheres while avoiding entropy (Betts, p. 39). This is what Senge (2006) describes as “*dynamic complexity*. It is a situation where cause and effect are subtle and where the effects over time of interventions are not obvious” (p. 71).

Axelrod and Cohen (2010) suggest that complexity can be harnessed. By this they mean “deliberately changing the structure of a system in order to increase some measure of performance, and to do so by exploiting an understanding that the system itself is complex. . . . To harness complexity typically means living with it, and even taking advantage of it, rather than trying to ignore or eliminate it” (p. 9). To harness complexity requires a shift in thinking:

- seeing interrelationships rather than linear cause-effect chains,
and
- seeing processes of change rather than snapshots (Senge, p. 73)

I suggest that applying systems thinking to the enterprise of teacher education could enable the field to emerge from stasis to being perceived and understood as a dynamic and complex system and could radically shift the ways in which we educate the young as well as their teachers. However, to do so means developing a new vision of teacher education—of its meaning, of its goals, of the process of educating teachers, of the roles of universities, schools, and communities in that process. Most important, it means understanding teacher education as a complex system in intimate relationship to the complex system of education.

Developing a Vision of Teacher Education as a Complex System

In 2014, my colleagues, initiators of the International Forum on Teacher Educator Development (InFo-TED), developed a new conceptual model to describe the work of teacher educators (see Figure 1). In every way, the model is the very picture of a complex system. The work of teacher education is visualized here as practice-based and “situated in the concrete context of the local teacher education institute” (Vanassche, et

al, 2015, p. 348) as well as in broader national and international contexts: As Vanassche and her colleagues write, “teacher educators’ practices are situated in a global level stressing their relation with supranational and societal change” (p. 348). However, the “starting point” for considering the work of teacher educators and teacher education itself “should lie in teacher educators’ lived practice” (p. 349) – the serious professional commitment to support the work of teachers and to shape the next generation of teachers.

<Please Insert Figure 1 here>

This is not an idealized conceptual framework. It represents the complex reality of the work of teacher educators. However, this complexity clouds perceptions of teacher education by policy-makers, the public, and other educators leading often to negative perceptions of the field.

The most common complaint about teacher education is that it is irrelevant and not connected to the real world of schools. As evidence, its detractors claim that schools continue to look as they did 100 or 150 years ago and that teaching has changed little despite remarkable advances in technology and new knowledge about how the brain works and how we learn. Further critique focuses on the relationship between universities and schools and paints university-based teacher education as bounded by routines and customs such as courses that fit with university schedules not those of schools and by both credit and grading systems that do not relate to the “real” world of teachers’ daily practice. Claims are made that university-based teacher education prioritizes theory over practice, that these theories of learning and teaching do not transfer to teachers’ practice, and that in what little practical experience they have, student teachers are rarely guided by mentors to develop an overview of the field and to see the connections among their courses and their experiences in the field (Levine, 2006). For their part, many teacher educators feel pressed by university systems that reward publication and grant winning over teaching, program development, and field-related practice. They note, too, that most universities generally offer far fewer resources to teacher education than to other education programs and other programs across the university.

To date, the response to these critiques by teacher educators has been largely defensive and with good reason: There is little in the current structures of teacher education that recognizes it as a complex system so little that could enable and support systems thinking. Instead, “fixing” teacher education devolves to individuals and individual programs in a system that places emphasis on hierarchy rather than interrelationship and on “pattern maintenance” rather than experimentation and creativity. As Betts (1992) writes,

We have attempted to treat education as a unitary system, but in reality it is highly pluralistic with many conflicting goals. The compromises that we have reached by applying old paradigms in a new context are proving to be unsatisfactory, but paradigm paralysis prevents us from seeing what is really needed. . . . The improvement of quality involves the design of an educational system that not only optimizes the relationship among the elements but also between the educational system and its environment. In general, this means designing a system that is more open, organic, pluralistic, and complex. (p. 39)

But how to move into an embrace of complexity?

If we go back to the conceptual model developed by InFo-TED that is intended as a framework for the preparation and ongoing professional learning of teacher educators and, instead, consider it as representative of the whole system of teacher education, then it serves to enable a systems perspective on the field. As Senge writes, “Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things . . . And systems thinking is a sensibility—for the subtle interconnectedness that gives living systems their unique character” (p. 68). Here, the relationships to be apprehended can be described in pursuit of the ideal of educating well both new and experienced teachers and teacher educators and ultimately all of those whom they teach.

A few examples of the interrelationships that can be read as implicit in the InFo-TED model might help to highlight the ways in which systems thinking could enhance research, practice, and policy regarding the professional learning of both teacher educators and teachers and could enable more cohesion and a stronger voice among educators in shaping both practice in and policy toward the field of teacher education. The most obvious areas of overlap relate to the “Dynamics of Professional Learning” and “Growth and Empowerment” (labels on either side of the fluid and interrelated core processes of teaching—see Figure 1) and to the entry points for professionals into teacher education (see bottom of Figure 1).

Dynamics of Professional Learning and Growth and Empowerment in a Complex System

Together, the labels, “Dynamics of Professional Learning” and “Growth and Empowerment,” incorporate / enclose the interactive constants of teaching and learning to teach as much for teachers as they do for teacher educators. For example, there is inferred here the understanding that teaching identities are often formed before teachers come into teaching by individuals’ educational experiences (Lortie, 1975) and that teachers’ identities continue to evolve over time in the context not only of the preservice experience but also in the workplace as visions of good teaching are communicated, shared, and shaped (Little, 2006, 2007). We can no more expect of beginning teacher educators that they have a broad and deep understanding of professional learning and the whole dynamic of teacher education than we can expect beginning teachers to have deep understandings of their content and of pedagogy appropriate to that content. Instead, for

both, it is essential that professional learning for teaching is understood as an intellectually complex activity that, optimally, develops over time with practice to become a high-level, contextually sensitive, refined activity (Rust, 2010). Whether the key knowledge, skills and sensibilities for teaching develop at this high level is not a matter of rote learning or prescriptive activity. Rather, becoming a teacher or a teacher educator is conceived as a dynamic, evolving process that requires specialized knowledge (Murray & Male, 2005) as well as sustained and guided practice in appropriate contexts (Berliner, 2009; Darling-Hammond, 2006a, 2006b; Grossman, et al, 2009) that enable thoughtful engagement for learning.

Looking across three related fields—clergy, teaching, and clinical psychology—Grossman and her colleagues (2009) laid out a framework for professional learning that situates the specialized knowledge related to these fields. Across all three, they found that professional preparation includes *representations, decompositions, and approximations* of practice. Representations are those live examples that serve as models for professional practice. Decompositions are thoughtful examinations of those models that are often conducted in collaboration between experienced professionals and novices so as to enable analysis. Approximations represent the efforts of novices to implement core practices. Depending on the field and the learning context, approximations proceed with guidance that is informed by the discussion and analysis afforded during decomposition. More often than not, what happens in the education of teachers and teacher educators is the collapsing together of representations and approximations and the exclusion of decomposition. This leads to the type of surface learning about teaching that Lemov (2010) and others push as core techniques for teaching. It completely by-passes the experiential learning, the “apprenticeship of observation” that Lortie (1975) described as foundational to teacher knowledge, and it misses what Korthagen (2016) describes as an “inconvenient truth about teacher learning,” that is, that students’ “thinking, feeling and wanting (must be taken) into account” (p. 5), i.e., that knowing one’s students is essential to teaching well. Such knowledge does not come to novices; it is developed over time and is a hallmark of expertise.

Gladwell’s (2008) writing about the development of expertise in a variety of areas suggests that 10,000 hours of practice – alone and guided – are essential and that expertise is developed over that time with desire for growth and improvement on the part of the learner and with encouragement to persevere from important others. Focusing specifically on teaching, Berliner (2009) writes that the development of expertise among teachers takes 10 years of practice and moves through five stages: novice, advanced beginner, competent, proficient, and expert. Berliner’s discussion of the development of expertise among teachers, includes no call for a specific pathway to follow or set of experiences in which to engage in teachers’ professional learning; there is no “blueprint” (Kelchtermans, Smith, & Vanderlinde, 2015) to follow. As Korthagen (2016) points out, “It is impossible to promote change (in the field of teacher education) through a pre-planned, fixed curriculum” (p. 5). Instead, he writes that, “we need a shift in focus from the curriculum to the learner” (p. 5). In the long run, “Attempts at influencing teacher behaviour have to be adjusted to individual teachers in their specific circumstances and settings” (p. 5). That means that teacher education must reach beyond the preservice

program.

We now know from research and experience over the past 30 years (Borko, 2004; Fullan, 2007; Hargreaves, 1998; Lieberman & Miller, 2001; Little, 2006, 2007; Zeichner, 2010) that professional development for teachers must be active, collaborative, embedded in a classroom context, and part of a school culture. It must enable inquiry that is relevant to practice. Systems thinking pulls toward using such deep study of teachers' professional learning at all levels as a basis for conceptualizing teacher education broadly as preparation **and** professional development and for drawing from the research the essential principles that could guide and support a radical reshaping of the field.

Rethinking/Reconceptualizing Teacher Education

For many teacher educators and teachers, initial preparation is essential for professional learning, but, as Darling-Hammond (2006), Korthagen (2016), Rust (2009) and others have written, it is only the beginning of the professional journey. If the very definition of teacher education were expanded to include teachers' and teacher educators' professional learning over the span of their professional lives, it is highly likely that a radical reconceptualization of the field would be in order: one that is inclusive of the diverse relationships implicit in the InFo-TED conceptual model.

In the first place, initial teacher education would be seen as part of a professional journey towards the development of expertise. With this understanding could come models or frameworks that would expand the definition of teacher educator to include university- and school-based professionals. Such models would ultimately complicate current understandings of the field and in doing so could enable researchers and policy-makers to appreciate the breadth and depth of the field and its intricate relationship with the larger educational world of schools and schooling.

A second major move designed to make teacher education powerful in the personal and professional life of a teacher would require a blurring of the boundaries between traditional teacher education programs and the schools they serve by changing the ways in which teachers are prepared for the profession and supported over the course of their professional lives. These new ways should necessarily draw on what we currently understand about how adults and children learn. These new ways should draw on teachers' prior knowledge and should enable preservice teachers to test their ideas and construct new conceptual understandings in the context of practice.

Were such shifts to begin to happen, new relationships between schools and universities are likely to gradually emerge. Systems theory suggests that, as these new relationships emerge, there will inevitably be a balancing process. As Senge writes,

Whenever there is resistance to change, you can count in there being one or more "hidden" balancing processes. Resistance to change is neither capricious or mysterious. It almost always arises from threats to traditional norms and ways of

doing things. Often these norms are woven into the fabric of established power relationships. The norm is entrenched because the distribution of authority and control is entrenched. (p. 87)

In teacher education, it is likely, even necessary, that in the balancing of new relationships and approaches, communities of practice as described by Wenger and Snyder (2000) and called for by Borko (2004), Darling-Hammond (2006a), Fullan (2007), Korthagen (2016), and others will emerge to shape and sustain these emerging cells of activity. These are what Gorodetsky and Barak (2008) describe as “edge environments.” They incorporate parts of two or more environments, for example, a school and a teacher education program. They exist in a “tender” zone in that what happens in the small cell is affected by what happens in the larger surrounding zones, for example, changes in leadership in either the school or the university. Wonderfully, they offer opportunities for experimentation, creativity, and, most important, community. Wenger and Snyder (2000) describe these as *peripheral communities of practice*—small centers of for experimentation within large business organizations such as the World Bank that “can drive strategy, generate new lines of business, solve problems, promote the spread of best practices, develop people’s professional skills, and help companies recruit and retain talent” (p. 140).

The nurturing of multiple “edge environments” working collaboratively with one another across space and time, as the InFo-TED experiment is beginning to demonstrate, could move the field toward what Darling Hammond (2006) argues for in her call for a 21st Century reconceptualization of the field:

. . . teacher educators, as a professional collective, need to work more intently to build on what has been learned about developing stronger models of teacher preparation—including the much stronger relationships with schools that press for mutual transformations of teaching and learning to teach—while resisting the pressures and incentives that lead to the creation of weaker models that ultimately reinforce dissatisfaction with the outcomes of teacher education and undermine the educational system. (pp. 3-4)

Embracing Complexity

But it is not enough to think about what a new system of teacher education could look like. At this moment in time, we need to actively attend to, learn from, and lift up for common understanding those exemplars that are already demonstrating what a robust field of teacher education could look like. There are examples everywhere and at all levels.

In early childhood, one has simply to think about Reggio Emilia in Italy (Edwards, et al., 1998) where a parental commitment at the end of World War II to educate their children against war sparked a model of teaching that puts the arts at the core of young children’s

experience and engages teachers in powerful collaborative study aimed at picking up on, guiding, and supporting children's creativity.

There are excellent models of university-based teacher education programs (Grossman et al, 2009b; Darling-Hammond, 2006b; Korthagen & Kessels, 1999) that have been studied carefully. The essential characteristics of each of these exemplars map directly onto what Darling-Hammond (2006a) holds to be the "three critical components" of high quality teacher education programs:

. . . tight coherence and integration among courses and between course work and clinical work in schools, extensive and intensely supervised clinical work integrated with course work using pedagogies linking theory and practice, and closer, proactive relationships with schools that serve diverse learners effectively and develop and model good teaching. (p.1)

New models are emerging that share these same characteristics and demonstrate the complexity of incorporating Darling-Hammond's second and third points. Two that deserve scrutiny because they are developed as university-school partnerships wherein courses and field experience come together within the school setting so that there is opportunity across the school itself for professional learning: One is the Penn Residency Master's in Teaching (PRMT) – a collaboration between the University of Pennsylvania and nine East Coast boarding schools. The other is the Clark University (Worcester, MA) Undergraduate/MAT program (Del Prete, 2010) that works collaboratively through its Adam Institute with local elementary and secondary public schools as partners. In both the Penn and Clark programs, the conversation about and around practice is such that students, preservice teachers, school faculty, and university-based educators are often heard using the same academic language with the same intent. In PRMT, one hears and reads about discussions of Dweck's (2010) concept of "growth mind set," the Csikszentmihalyis' (1998) concept of "flow," or Wiggins' and McTighe's (1998) "enduring understandings." One also hears and reads of preservice students and their mentors in the schools mining the current practice-related research of mathematics educators, social studies educators, dance educators, etc. Similarly, in the Clark program, where the focus of professional development around a content area is consistent across the school, one can hear young children for whom English is a second language talk about "adjectives to give more atmosphere," "commas so that you can breathe between words," using "big" words by consulting the "word wall" – using such language with exactly the same intent and meaning as the adults around them. Both of these programs can be seen as centers for experimentation so as opportunities to learn and test new models; at the same time, both demonstrate the vulnerabilities that edge environments share in large centralized organizations (Wenger & Snyder, 2000).

In current research literature on professional learning, there are fascinating examples of approaches and programs wherein the quality of practice has shifted dramatically as teachers and teacher educators work together as a community of learners. See, for example, Lewis and Tsuchida's (1998) collaboration on Lesson Study, Hadar and Brody's (2013) work on developing a professional learning community in higher

education, and Dickerson and her colleagues (2016) study of using action, reflection and modeling to develop a teacher education program in a Malaysian school system. These studies and so many like them provide examples of the breadth, depth, and complexity of the field of teacher education.

In many ways, all of these are edge environments in that they break out of traditional norms. They offer the opportunity to test theories – about student-centered learning and teacher agency (Reggio Emilia, PRMT, Clark); about what collaboration between schools and universities could look like (PRMT, Clark, Dickerson et al); about professional learning not only in preservice but across the professional spectrum among teachers and teacher educators (PRMT, Clark, Dickerson et al); about the practical “business” side of teacher education (PRMT and Clark); about professional learning (all and especially the three research studies).

At the same time, they are all highly vulnerable to the larger systems in which they are embedded. Reggio is vulnerable to at least two factors that intertwine: the city’s ongoing willingness to support the creative model in the face of immigration from outsiders. PRMT and Clark are vulnerable on several counts that also intertwine: maintaining the model as principal faculties move to other projects and new faculties enter, as new deans and school heads enter their respective spheres of influence, as the “business” side of the models is reviewed and changed. The research-based models described by Lewis and Tuschida (1998), Hadar and Brody (2013), and Dickerson et al (2016) are vulnerable *in situ* for many of the reasons cited above. As well, there is a dissemination problem that affects all of these models: They are likely only known to readers of academic literature, so they may be absent from most discussions outside of teacher education regarding reconceptualization in the field.

Lessons learned from these edge examples push toward an embrace of complexity. They suggest a radical broadening of the conversation about teaching and learning to teach that is at the same time acceptable to the academy and educative to the public. They suggest a willingness to collaborate and engage in serious conversation about practice, to learn from one another as is done in Japan around Lesson Study (Lewis & Tsuchida, 1998) and in a small way in the United States in UTEC (Urban Teacher Education Consortium) (see <http://www2.clarku.edu/education/adam-institute/urban-teacher-education-consortium/position-statement.cfm>). They suggest that there must be willingness on the part of universities and schools to support and learn from experiments like PRMT and the Clark Program recognizing that, “As communities of practice generate knowledge, they renew themselves. They give you both the golden eggs and the goose that lays them” (Wenger & Snyder, 2000, p. 143).

Looking toward the Future

Systems theory does not offer definitive answers about reconceptualization of the field of teacher education. Rather, it suggests that the very complexity of the field requires a powerful shift in practice and in thinking—a shift that enables a commitment to

experimentation at every level, a tolerance for multiple, even seemingly conflicting models, and the embrace of open communication that reaches beyond higher education and acknowledges and draws strength from the uncertainties that are inherent in a robust system. Systems theory embraces complexity. It does not allow for a single answer, a best system. Rather, it invites multiple visions of possibility, multiple enactments of theory, multiple perspectives on practice, multiple ways of learning, multiple forms of assessment—all in the service or toward the realization of the ideal of educating well both new and experienced teachers and teacher educators and ultimately all of those whom they teach. Let's let the hydra live and learn from it.

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