Chapter 4
Teacher Education and ESD in the United States: The Vision, Challenges, and Implementation

Victor Nolet

Teacher-education institutions can play a critical role in the work of reorienting education systems at all levels to address sustainability. As the primary source for the preparation of new teachers and delivery of professional development and advanced degrees for veteran teachers, teacher-education programs exert a major influence on the education that is delivered in schools. In the United States, there are more than 1,400 teacher-education institutions, and approximately 90% of all new teachers are prepared at one of those programs (American Association of Colleges for Teacher Education, 2011). The potential influence of teacher-education programs becomes evident when one considers that there are approximately 3.7 million K-12 teachers in US classrooms today, and the National Center for Educational Statistics (2011) projects that, by 2017, there will be 4.2 million teachers working in public school classrooms. Most of those additional teaching positions will be filled by newly certified teachers.

Teacher-education programs generally are housed as academic units within larger colleges or universities, and as members of the academy, teacher-education faculty members contribute directly to the creation and dissemination of new knowledge through research and publication activities. Furthermore, teacher preparation usually involves faculty in the arts and sciences and humanities, so that teacher education at many institutions is a campus-wide endeavor.

In addition to their contribution to scholarship, teacher educators in the United States frequently participate directly in the development of state education policy by serving on policy advisory committees and oversight boards as well as by testifying at legislative hearings. Similarly, national education organizations of which teacher educators are members, such as the *American Association of Colleges for Teacher*

V. Nolet (✉)
Woodring College of Education, Western Washington University, Washington, DC, USA
e-mail: victor.nolet@wwu.edu

R. McKeown and V. Nolet (eds.), *Schooling for Sustainable Development in Canada and the United States*, Schooling for Sustainable Development 4,
DOI 10.1007/978-94-007-4273-4_4,

Education and the *American Educational Research Association,* exert significant influence on national policy and state policy agendas.

Education for sustainable development (ESD) is not yet a prominent feature of teacher education in the United States. However, in pockets of innovation around the country, teacher educators have begun to address ESD in the preservice and advanced professional development of teachers. Viable strategies and models for integrating ESD into the professional development of teachers exist in the United Sates today and serve as tangible proof of the viability of a transformed US teacher-education system that addresses sustainability.

This chapter explores a vision for bringing about broader inclusion of ESD in the professional development of teachers in the United States. It draws upon the knowledge developed in the international movement in ESD as well as recent research focusing on the characteristics of effective teacher preparation in the United States. It also identifies program design and implementation strategies that appear to have been successful in US teacher-education programs already addressing ESD. However, any discussion of a transformed teacher-education system must be tempered with a frank assessment of the contextual realities of teacher education in the United States today, so that is where this chapter begins.

The Context of Teacher Education in the United States

Today, the fundamental assumptions that have informed teacher education for most of the last century are being challenged by critics from outside the profession as well as by new research findings from within (Grossman, 2008; Hess, 2009), and all aspects of teacher education are being called into question, including the structure, curriculum, goals, and outcomes. Preservice campus-based courses are being replaced by extended field placements, while the efficacy of so-called general methods classes continues to be challenged as these courses are replaced by discipline-specific pedagogy classes that address pedagogical content knowledge (Bullough, 2001; Mirel, 2011).

Traditional university-based programs exist side by side with a wide range of innovative and at times controversial approaches including school district-operated credentialing programs and a wide variety of "alternative routes" to certification (Dai, 2007; Zeichner & Conklin, 2005). At the same time, university-based "bricks-and-mortar" preparation programs are finding that they must now compete with online colleges fully approved by state education agencies to offer courses leading to licensure (Zeichner, 2006). The long-term viability and efficacy of internet-based programs are not yet known; however, the continued growth of online teacher-education programs is probably inevitable.

Teacher Education and Public School Reform

Teacher education in the United States is inseparable from the larger context of public preK-12 education (i.e., preschool, kindergarten through twelfth grade), so it

is impossible to understand the transformation underway in teacher education without examining preK-12 education. Public schools in the United States are still based largely on early twentieth-century concepts of workforce development and centralized administrative control. Early twentieth-century school reformers sought to impose economic notions of efficiency on the education sector (i.e., greater output with no additional input of resources) through standardization of nearly every aspect of schools including buildings, curricula, professional credentialing, and administrative functions. This was a flawed policy strategy that preserved the inequities present in the US economy and society at the height of the Jim Crow era and women's suffrage movement. A century later, those structural problems still exist in the US education system, and today, the single most salient characteristic of the United States education system may be its inequity (Children's Defense Fund, 2011; Wilkinson & Pickett, 2009).

Access to the benefits of an adequate public school education is highly dependent on family income, race, and language. As a result, some children in the United States experience a publicly funded education that includes access to state-of-the-art technology, highly skilled and experienced teachers, a broad choice of curricular offerings including Advanced Placement (AP) and International Baccalaureate (IB) courses, and a diverse palette of extracurricular offerings. At the same time, a large segment of children in the United States experience a publicly funded education in poorly equipped buildings in disrepair, outdated curriculum materials, and access to only the most rudimentary educational technology. Often, the least well-prepared teachers are disproportionately assigned to teach the least advantaged students in high-minority and low-income schools (National Commission on Teaching and America's Future, 1996).

Inevitably, these inequities result in lower achievement and diminished opportunities for students from disadvantaged backgrounds while preserving the privileged status of students from middle-class and wealthy families. The impacts of these inequities are simply devastating. According to the *State of America's Children* report issued by the Children's Defense Fund (2011):

- Nearly 80% or more of Black and Hispanic public school students in the fourth, eighth, and twelfth grades are unable to read or to complete math problems at grade levels compared to 50% or more of White children.
- Black students are suspended from school more than three times more often than White or Asian/Pacific Islander students and two times more often than Hispanic students.
- Thirty-five percent of Black and 29% of Hispanic high school students attend one of the more than 1,600 "dropout factories" across the country. These are schools where 60% or fewer of the students in any given ninth grade class will graduate in 4 years with a regular diploma.
- The average graduation rate for Black and Hispanic students is just over 60%, compared with 81% for White and 91% for Asian/Pacific Islander students. This pattern exists in 13 states.
- Approximately two-thirds of the individuals in the juvenile justice system are youth of color.

- Black youths are arrested for violent offenses more than three times more often than youth in all other groups.
- An average of 12% of Hispanic and 19% of Black people aged 25–29 years old are likely to graduate from 4 years of college, compared with 31% of White people the same age.

Embedded in this alarming scenario is the fact that the US preK-12 teaching force as well as the faculty of many teacher-education programs is overwhelmingly White, female, middle class, and suburban (Aud et al., 2011; Sleeter, 2001). Teachers of color represent only about 16% of the US teaching force and about 21% of beginning teachers (Aud et al.). Yet the US school-aged population is becoming increasingly more linguistically, culturally, ethnically, and economically diverse, resembling more than ever the characteristics of the rest of the world. Today, about 45% of public school students are students of color (Aud et al.).

As public impatience with the inadequacy of US schools has grown, calls for education reform have increasingly targeted teacher-preparation programs. For example, during the early 2000s, changes in federal legislation authorizing funding for higher education institutions (Title II of the Higher Education Act) were tied to the accountability requirements of the elementary and secondary education funding legislation known as No Child Left Behind. To receive federal funds under these two programs, states were required to impose stringent assessment and reporting requirements on teacher-education programs. Today, teacher candidates often are required to pass tests of general knowledge and content pedagogical knowledge to be admitted to teacher-education programs or to be eligible for student teaching.

In many states, teacher-education candidates also are required to pass a performance-based assessment at the conclusion of student teaching (Chung, 2008). For example, the *Teacher Performance Assessment* (TPA) is currently being piloted in 21 states and more than 100 teacher-preparation programs. The *Teacher Performance Assessment* is based on the highly successful *Performance Assessment for California Teachers* (PACT) and consists primarily of a multiple measure assessment system documenting teaching and learning in 3–5-day learning segments for one class of students. In a number of states, teacher-education programs are required to report pass and fail rates on these various assessments to state education agencies as well as to the US Department of Education.

Impacts of the Economic Recession

Of course, this entire discussion of school reform takes place against the backdrop of the worldwide economic recession that has persisted since the fall of 2008. The nonpartisan Center on Budget Priorities reported that in fiscal year 2012, 38 states made deep, identifiable cuts in K-12 or higher education spending, in most cases spending less than they did in 2008, even though school enrollments have steadily increased during that time. Many public colleges and universities were forced to

increase tuition, sometimes by as much as 15% in 1 year to make up the difference. Tight budgets and changes in financial aid and federal funding formulas also prompted colleges and universities to impose stricter "time to degree" requirements to ensure that students are able to complete a baccalaureate degree within 4 years. Students who fail to complete a bachelor's level degree within 4 years may lose eligibility for financial aid. As a result, colleges and universities are more closely scrutinizing program degree requirements.

Challenge or Opportunity?

One might despair at the difficulty of envisioning a strategy for reorienting teacher education to address sustainability when teacher education is experiencing rapid structural changes, when public satisfaction with education institutions is historically low, and when tight budgets and stringent accountability requirements have reduced curriculum flexibility. However, the turbulent and rapidly changing context of education in the United States today is part of the tectonic economic, social, and political changes underway in society at large. There is a growing consensus that teacher education cannot simply react to societal and economic trends but must become a driver of social and economic change (Apple, 2011; Caillier & Riordan, 2009; Darling-Hammond, 2011; Wang, Lin, Spalding, Odell, & Klecka 2011). The uncertainties that surround preK-12 public education in the United States may be precisely the context in which the new type of thinking that is ESD can take root.

One need not think of ESD as something new that needs to be shoe-horned into an overcrowded teacher-education curriculum. Instead, it can provide strategies for addressing the challenges teacher education faces today. The remainder of this chapter will present a discussion of four elements of a vision for teacher education reoriented to address sustainable development. Those elements directly address the current context of teacher education today and at the same time represent the core dimensions of ESD discussed in Chap. 1.

Reorienting Teacher Education to Address Sustainable Development

The four thrusts of ESD (improving basic education, reorienting existing curricula, developing public awareness, and workforce training) described in Chap. 1 form the overarching framework for the reorientation of the US teacher-education system. As the discussion in Chap. 1 emphasizes, those four priorities must be implemented through the filter of local and cultural relevance.

The importance of local relevance becomes clear in the context of teacher education in the United States. There can be no "one size fits all" model that will work in

every program. Teacher-education programs across the country vary tremendously as each program reflects the goals and mission of its parent institution, the philosophical and pedagogical orientation of program faculty, state credential requirements, the needs of local stakeholders including teacher candidates and local schools and their surrounding communities.

The international movement in ESD is beginning to provide research-validated information about program elements, pedagogy, and quality indicators that can be applied in US teacher-education programs, regardless of local program characteristics. In a report commissioned by UNESCO as part of the ongoing program to monitor the impacts of the United Nations Decade of Education for Sustainable Development (DESD), Tilbury (2011) identified specific learning processes that underpin successful ESD initiatives. Those processes are:

- Collaboration and dialogue, especially processes that encourage the participation of multiple stakeholders as well as intercultural dialogue.
- Holistic or "whole system" approaches that entail transformation of the curriculum, schools, communities, and families.
- Innovation in the curriculum as well as in teaching and learning experiences.
- Active and participatory learning.

Tilbury (2011) noted that successful ESD projects involve more than conveying new knowledge but also involve learning to ask critical questions, clarifying one's own values, envisioning more positive and sustainable futures, thinking systemically, responding through applied learning, and exploring the tensions between tradition and innovation.

Tilbury's findings bear remarkable resemblance to findings from research about the characteristics of successful teachers and teacher-education programs in the United States. Successful teachers are critical thinkers, have effective collaboration skills, reflect on their own impacts on student learning, and are skilled at balancing innovation with established practices (Bransford, Darling-Hammond, & LePage, 2005; Cochran-Smith & Zeichner, 2005; Darling-Hammond, 2011; Fraser, 2010). This degree of concordance of the ESD and teacher-education research creates a clear pathway for reorienting teacher education to address sustainability.

Recognizing the critical role of teacher-education institutions in reorienting the world's education systems to address sustainability, UNESCO established the UNITWIN[1]/UNESCO Chair on Reorienting Teacher Education to Address Sustainability at York University in Toronto, Canada, in 1999. The Chair convened an *International Network* of Teacher Education Institutions (TEIs) that now includes members from more than 60 countries and has met biennially since 2000. In 2005, UNESCO published the *Guidelines and Recommendations for*

[1]UNITWIN is the abbreviation for the University Twinning and Networking Programme. The UNITWIN/UNESCO Chairs Programme seeks to advance research, training, and program development by building university networks and encouraging interuniversity cooperation through the transfer of knowledge across borders.

Reorienting Teacher Education to Address Sustainability (UNESCO, 2005) which was prepared by the Chair, Charles Hopkins; Secretariat, Rosalyn McKeown; and members of International Network.

The *Guidelines and Recommendations* document is a blueprint for reorienting teacher-education programs worldwide to address sustainability and illustrate that there are many ways to address sustainability in teacher education. The TEIs in the International Network addressed a wide variety of issues and initiatives under the broad rubric of ESD. Concomitantly, "on the ground" implementation of these guidelines in teacher-education programs in the United States would vary according to local program and community characteristics.

However, the complex context for teacher education in the United States described in the first section of this chapter as well as the lessons learned from the *International Network* suggest that there is a set of core strategies for reorienting teacher-education programs to address sustainable development. Those strategies are:

1. Focus on improving outcomes for all students.
2. Embed ESD in the process of learning to be a teacher.
3. Use existing structures, processes, and local resources.
4. Provide professional development for faculty and administrators.

Focus on Improving Outcomes for All Students

Consistent with the first priority of education for sustainable development (ESD) of improving basic education, teacher-education programs in the United States must first and foremost seek to address the significant inequities in the US education system and particularly to improve educational outcomes for poor and minority children. The goals of promoting a more sustainable and just society in the United States cannot succeed as long as a large proportion of children are systematically denied the benefits of an adequate education.

As McKeown (2002) emphasizes, the recognition of the need for quality education sets education for sustainable development apart from other educational endeavors such as environmental education or economic education. Those interested in reorienting teacher education to address sustainability must come to view this issue as equal in importance with other aspects of sustainable development such as reducing CO_2 emissions, preserving wilderness areas, promoting gender equity, supporting local economies, or promoting biodiversity. Clearly ensuring that all children in the United States have access to an adequate education is fundamental to the ideal of meeting the needs of the current generation while making sure future generations can meet their needs.

While teacher-education programs cannot be expected to fix the deep structural flaws in the US education system that create inequities, there are a number of strategies for helping teachers become better prepared to meet the needs of all students in their classrooms.

These strategies are generally associated with helping teachers develop a culturally responsive teaching practice (Banks et al., 2005; Sleeter, 2001), meeting the needs of English learners (Garcia, Beatriz Arias, Harris Murri, & Serna, 2010) and differentiating instruction for students with diverse learning needs (Tomlinson, 2001). The research investigating the efficacy of these approaches consistently has shown that teacher-preparation programs can help prepare prospective teachers to teach poor and minority as well as English language learners successfully. The programs that have been most successful in this work have a number of common features as summarized by Garcia et al. (2010):

- The curriculum is grounded in the knowledge of child and adolescent development, learning, social contexts, and subject matter pedagogy, taught in the context of practice.
- Extended clinical experiences are carefully developed to support the ideas and practices presented in simultaneous, closely interwoven coursework.
- Explicit strategies to help students confront their own deep-seated beliefs and assumptions about learning and students and learn about the experiences of people different from themselves (p. 135).
- A common, clear vision of good teaching permeating all coursework and clinical experiences.

In addition to providing teacher candidates with opportunities to learn strategies aimed at creating culturally responsive, inclusive classrooms, teacher-education programs need to aggressively recruit members of underrepresented groups into the profession. Strategies for increasing the diversity of the teaching force include options such as creating pathways for paraprofessionals to enter programs, partnerships with community colleges that serve minority communities, and exploration of alternative route preparation programs that better serve the needs of career and place-bound students. At the same time, mentoring and peer-support programs aimed at helping first-generation college attendees navigate the complexities of college can help teacher-education recruits from underrepresented populations stay enrolled and eventually graduate from teacher-preparation programs.

Embed ESD in the Process of Learning to Be a Teacher

As the examples in the *Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability* (UNESCO, 2005) illustrate, teacher-education programs in the United States will each implement ESD in locally relevant ways, based on the values and goals of the program. However, it will be important for teachers prepared in those programs to develop a thorough understanding of sustainability and the strategies associated with ESD. More to the point, teacher-education programs should avoid selectively privileging one sphere, such as the environment or social justice, over a more interconnected view of sustainable development. It is this interconnected perspective that distinguishes ESD from the various adjectival education programs (see Chap. 1).

The more formal notion of sustainable development as a process that balances human and economic well-being with cultural traditions and the health of the earth's

natural systems is a complex and potentially difficult idea to teach. Moreover, sustainable development is highly contextual, and the idea of "development" can be difficult to understand for individuals living in the United States. However, there are a number of "portals" through which teachers can pass to gain a more complete understanding of the complexity of sustainability. These are issues or topics that provide an opportunity to examine the interconnectedness of the core ideas associated with sustainability: society, environment, and economy.

For example, the teacher-education program *Teaching for a Sustainable Future: A multimedia teacher education programme* (UNESCO, 2010) identifies a number of global issues that can serve as curriculum foci for exploration of sustainable development. Those global issues include:

- Culture and religion for a sustainable future,
- Indigenous knowledge and sustainability,
- Women and sustainable development,
- Population and development,
- Understanding world hunger,
- Sustainable agriculture,
- Sustainable tourism,
- Sustainable communities.
- Globalization, and
- Climate change.

Similarly, Nolet (2009) identified nine thematic topics that would be part of a "sustainability-literate" teacher's knowledge base:

- Intergenerational perspective,
- Environmental stewardship,
- Social justice and fair distribution,
- Respect for limits,
- Systems thinking and interdependence,
- Importance of local place,
- Economic alternatives,
- Nature as model and teacher, and
- Global citizenship.

Teacher-education programs interested in addressing sustainable development should look for ways to include these portals in required coursework, field experiences, or cognate and prerequisite courses. Some specific program-design strategies for doing so are addressed in the next section of this chapter.

In addition to addressing the conceptual elements of sustainable development, it is also important that teacher-education programs provide opportunities for candidates to develop what might be thought of as *pedagogical content knowledge* associated with sustainability. Teachers need to know when and how to integrate ideas associated with sustainable development into lessons and units, how to model practices associated with sustainability, and how to link sustainable development ideas to other aspects of student learning (e.g., literacy, numeracy, and metacognitive strategies). Equally important, teachers need to learn how to convert sustainability-based

pedagogical content knowledge into "high-leverage practices" (Lampert, 2010) that lead to comparatively large advances in student learning. This can be used to address common problems of practice that teachers encounter regularly and that novices will need to employ once they begin teaching.

For example, McClanahan (2010) describes a process for using first-person narratives pertaining to climate change to help native Alaskan students develop literacy skills. Similarly, Carney (2011) described a study in which four teacher candidates placed in a year-long internship in an elementary school with a garden learned to teach for sustainability. She found that the factors that could increase or decrease the likelihood of preservice teachers incorporating sustainability-related content into their practice included method courses that model appropriate strategies and materials, field placements where sustainability principles are enacted, and content standards that target higher-level thinking and the application of learning.

Use Existing Structures and Processes

Given all of the forces currently acting upon teacher education, it would be a fool's errand to attempt to radically change teacher education to address sustainability. A more sensible approach is to look for ways to address existing programmatic problems and needs by employing knowledge and strategies associated with sustainability. This approach is dependent on use of existing structures, processes, and local resources. Structures can include existing organizational and curriculum structures such as departments, programs, courses, degrees, or field experiences. Processes can include a variety of administrative and academic processes including program approval and accreditation, tenure and promotion, or travel authorization as well as on-campus resources such as the campus sustainability committee or faculty in other colleges.

Certificate Programs

A number of TEIs in the United States have begun integrating ESD into the preservice and in-service programs by adapting or slightly modifying existing program structures. For example, West Chester University recently developed a 12-credit, four-course certificate in ESD. Such certificate programs usually require a low level of institutional or state approval and can be operated as self-supporting summer courses or electives, thereby incurring little additional expense to the institution. Although adding a certificate sequence can increase a teacher candidate's "time to degree" and may have limited value for prospective teachers in the job market, they can serve as a first step for program planners interested in eventually building an academic degree program in sustainability.

Sustainability Concentration

A more robust approach to including ESD in the preparation of teachers involves offering a sustainability concentration within an existing graduate degree program. For example, in addition to a certificate, Webster University's Education for Global Sustainability program is available as a concentration in the Master of Arts in Teaching (MAT) degree.

State Endorsement and Certification Requirements

A more "upstream" approach for reorienting teacher education to address sustainability involves changes to the licensure that all teachers must acquire to be eligible to teach in a particular state. Often, teacher-education programs are able to exert considerable influence on the process of establishing new specialized license elements, such as special endorsements or on the core elements of the basic license itself, often referred to as "certification."

Certification

In Washington, similar to many other states, teacher-education programs are approved by the Professional Educator Standards Board. Program approval of TEIs is guided by standards addressing a variety of program features, including standards pertaining to the knowledge and skills teacher candidates must acquire. As Wheeler describes in Chap. 8, Washington now requires that beginning teachers are able to prepare K-12 students "to be responsible citizens for an environmentally sustainable, globally interconnected, and diverse society" for basic certification. As a result, all 21 state-approved teacher-education programs in Washington are now required to address ESD in the preservice programs. Teacher-education programs have approached this task in a number of ways, including infusion of sustainability-related content into existing classes as well as through field experiences or specialized field projects.

Specialty Area Endorsement

In 2009, the Washington Professional Educator Standards Board, which oversees all aspects of teacher preparation and licensure, approved a new specialty area endorsement in Environmental and Sustainability Education. This endorsement is available to any licensed teacher in Washington at any grade level. A number of TEIs in the state have begun offering the endorsement, and others will follow shortly.

Accreditation of TEIs

The accreditation process for TEIs also offers an opportunity for introducing ESD into the preparation of teachers. Under the new CAEP[2] accreditation process, teacher-education programs will have the option of pursuing transformative initiatives aimed at self-improvement, reform of the teaching profession or learning in preK-12 schools, and research. This transformative initiative route offers programs a powerful strategy for addressing ESD as a systemic, college-wide process.

Provide Professional Development for Faculty and Administrators

ESD represents a new way of viewing the preparation of teachers and school administrators. It involves specific knowledge as well as dispositions that entail professional and personal engagement with complex sustainability issues. The process of reorienting teacher education to address sustainability must include opportunities for teacher-education faculty and administrators to gain knowledge and experience with the core propositions and knowledge base involved in sustainable development.

Any efforts to provide professional development must attend to the unique professional contexts in which teacher educators operate, both as members of the teaching profession and as members of the academy. Information provided to teacher educators will need to be highly credible, research validated, and embedded in the context of their work. Generally, teacher-education faculty will want to direct their own learning process through self-directed inquiry or research.

Strategies that have the potential for success include:

- Allocating funds for faculty to attend sustainability-related conferences, symposia, or meetings.
- Providing incentives for faculty to engage in scholarship related to ESD.
- Establishing a faculty fellows program that provides financial and time support for faculty to participate in peer study groups.
- Establishing a visiting scholars program that provides opportunities for faculty members to interact and work with scholars in sustainability-related fields.
- Providing incentives and supports for faculty to participate in sustainable development projects around the world, particularly those focused on teachers and schools.
- Providing supports for faculty to develop new courses or programs addressing ESD.

[2]Recently, the Teacher Education Accreditation Council (TEAC) and the National Council for the Accreditation of Teacher Education (NCATE) merged, and the new organization is called the Council for the Accreditation of Educator Preparation (CAEP).

- Encouraging faculty to participate in campus sustainability efforts.
- Developing partnerships with local schools and community groups focusing on sustainability initiatives and providing incentives for faculty to participate.

Concluding Remarks

The term "paradigm shift" has been overused and frequently misunderstood since Kuhn (1996) first applied the idea to the periodic transformations in scientific reasoning that have occurred throughout history. However, it is apparent that a paradigm shift is now underway as humanity begins to come to terms with the absolute finitude of our planet. Life during a paradigm shift can be confusing, contentious, and uncertain, and this certainly describes the state of teacher education in the United States today.

Education systems in the United States are deeply mired in "old paradigm thinking" that embraces belief in unlimited-growth economic models, natural systems that exist outside of the laws of thermodynamics, and an irrational faith in entitlement and privilege. Education for sustainable development represents "new paradigm thinking" that embraces recognition of limits, systems interconnectedness, and a commitment to equity and human development.

This paradigm shift presents US teacher-education institutions with a crucial decision—hold fast to the status quo of old paradigm thinking or lead the way toward sustainability. The choice is clear. The old paradigm offers only a Procrustean bed of regulation, standardization, decreasing relevance, and inevitable obsolescence. The new paradigm offers uncertainty and discomfort, but it also offers something else—the possibility of transformation.

References

American Association of Colleges for Teacher Education. (2011). *Transformations in educator preparation: Effectiveness and accountability*. Washington, DC: Author.

Apple, M. W. (2011). Global crises, social justice, and teacher education. *Journal of Teacher Education, 62*(2), 222–234.

Aud, S., Hussar, W., Kena, G., Bianco, K., Frohlich, L., Kemp, J., Tahan, K. (2011). *The condition of education 2011* (NCES 2011–033). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Banks, J., Cochran-Smith, M., Moll, L., Richert, A., Zeichner, K., LePage, P., et al. (2005). Teaching diverse learners. In *Preparing teachers for a changing world: What teachers should learn and be able to do* (pp. 232–274). San Francisco: Jossey-Bass.

Bransford, J., Darling-Hammond, L., & LePage, P. (2005). Introduction. In L. Darling-Hammond & J. Bransford (Eds.), *Preparing teachers for a changing world: What teachers should learn and be able to do* (pp. 1–40). Washington, DC: Jossey-Bass.

Bullough, R. V. (2001). Pedagogical content knowledge circa 1907 and 1987: A study in the history of an idea. *Teaching and Teacher Education, 17*, 655–666.

Caillier, S. L., & Riordan, R. C. (2009). Teacher education for the schools we need. *Journal of Teacher Education, 60*(5), 489–496.
Carney, J. (2011). Growing our own: A case study of teacher candidates learning to teach for sustainability in an elementary school with a garden. *Journal of Sustainability Education, 2*. Retrieved from http://journalofsustainabilityeducation.org/
Children's Defense Fund. (2011). *State of America's children*. Washington, DC: Children's Defense Fund.
Chung, R. R. (2008). Beyond assessment: Performance assessment in teacher education. *Teacher Education Quarterly, 35*(1), 7–28.
Cochran-Smith, M., & Zeichner, K. (Eds.). (2005). *Studying teacher education: The report of the AERA panel on research and teacher education*. Mahwah, NJ: Lawrence Erlbaum.
Dai, C. S. (2007). Economic analysis and the design of alternative-route teacher education programs. *Journal of Teacher Education, 58*(5), 422–439.
Darling-Hammond, L. (2011). Teacher education and the American future. *Journal of Teacher Education, 61*(1–2), 35–47.
Fraser, J. W. (2010). A tale of two futures: A fable of teacher education in the United States in 2015. *Kappan, 92*(2), 29–31.
Garcia, E., Beatriz Arias, M., Harris Murri, N., & Serna, C. (2010). Developing responsive teachers: A challenge for a demographic reality. *Journal of Teacher Education, 61*(1–2), 132–142.
Grossman, P. (2008). Responding to our critics: From crisis to opportunity in research on teacher education. *Journal of Teacher Education, 59*(1), 10–23.
Hess, F. M. (2009). Revitalizing teacher education by revisiting our assumptions about teaching. *Journal of Teacher Education, 60*(5), 450–457.
Kuhn, T. (1996). The structure of scientific knowledge. In J. Appleby, E. Covington, D. Hoyt, M. Latham, & A. Sneider (Eds.), *Knowledge and postmodernism in history* (pp. 340–355). New York: Routledge. (Excerpted from Kuhn T. (1970). *The structure of scientific revolutions* (pp. 1–204).Chicago: University of Chicago Press).
Lampert, M. (2010). Learning teaching in, from, and for practice: What do we mean? *Journal of Teacher Education, 61*(1), 21–34.
McClanahan, L. (2010). First persons singular: Documenting climate change. *Green Teacher, 88*, 14–26.
McKeown, R., Hopkins, C., Rizzi, R., & Chrystalbridge, M. (2002). *Education for sustainability toolkit*. Knoxville, TN: University of Tennessee. Retrieved from http://www.esdtoolkit.org
Mirel, J. (2011). Bridging the widest street in the world. *American Educator, 35*(2), 6–12.
National Center for Educational Statistics. (2011). *Projections of education statistics to 2019*. Washington, DC: Author.
National Commission on Teaching and America's Future. (1996). *What matters most: Teaching for America's future.* Washington, DC: Author.
Nolet, V. (2009). Preparing sustainability-literate teachers. *Teachers College Record, 111*(2), 409–442.
Sleeter, C. (2001). Preparing teachers for culturally diverse schools. *Journal of Teacher Education, 52*(2), 94–106.
Tilbury, D. (2011). *Education for sustainable development: An expert review of processes and learning.* Paris: UNESCO. Retrieved from http://unesdoc.unesco.org/images/0019/001914/191442e.pdf
Tomlinson, C. (2001). *How to differentiate instruction in mixed ability classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.
UNESCO. (2005). *Guidelines and recommendations for reorienting teacher education to address sustainability* (Technical Paper 2). Paris: UNESCO. Retrieved from http://unesdoc.unesco.org/images/0014/001433/143370e.pdf
UNESCO. (2010). *Teaching and learning for a sustainable future: A multimedia teacher education programme*. Paris: UNESCO.

Wang, J., Lin, E., Spalding, E., Odell, S., & Klecka, C. (2011). Understanding teacher education in an era of globalization. *Journal of Teacher Education, 62*(2), 115–120.

Wilkinson, R., & Pickett, K. (2009). *The spirit level: Why greater equality makes societies stronger*. London: Bloomsbury.

Zeichner, K. (2006). Reflections of a university-based teacher educator on the future of college- and university-based teacher education. *Journal of Teacher Education, 57*(3), 326–340.

Zeichner, K., & Conklin, H. G. (2005). Teacher education programs. In M. C.-S. Zeichner (Ed.), *Studying teacher education: The report of the AERA panel on research and teacher education* (pp. 645–735). Washington, DC: American Educational Research Association.