

Developing an ecology of disabilities framework: viewing disability inclusively

Developing an
ecology of
disabilities
framework

Gabriela Walker

Department of Special Education, National University, San Diego, California, USA

Received 26 July 2023
Revised 10 September 2023
Accepted 10 September 2023

Abstract

Purpose – This study introduces an ecological framework for disabilities meant to provide a new model of viewing and learning about disabilities and special education. This model projects a multi-systemic view of factors that influence a person's life, where people with disabilities are active actors in the development of the world. The increased awareness about interconnectedness, globalization, inter- and trans-disciplinarity, influences on human experience, greening, sustainability, inequality, inequity and lack of opportunities is shifting how people think about potential and growth.

Design/methodology/approach – The methodological approach is qualitative, interpretive research.

Findings – In disability studies, the Ecological Model of Disabilities helps reframe this uniqueness as part of the spectrum of human experiences. In special education, the Ecoducation Model helps reframe the learning experience.

Research limitations/implications – This research is conceptual, but it is also all-inclusive, rendering itself to a wide application in educational settings.

Practical implications – The Ecoducation Model for Special Education is specific to the education of children and adults with disabilities, and it is directly compatible with the broader Ecological Model of Disabilities. These ecological models can be applied to all levels of the ecological system, and to different ecodemes of population. Nevertheless, the ecological models need to be locally implemented, with general principles tailored to national traditions, laws and resources.

Social implications – Advocating for the pursuit of individual well-being within the larger society, both models call for practical changes in a multitude of areas, including legislation and policy, training of professional personnel, sufficient financial input in programs designed for the care of children and adults with disabilities, change in societal mentalities to fight discrimination, disempowerment and isolation. Because the scope of ecological frameworks is incommensurate, being both interdisciplinary and transdisciplinary, further research possibilities are countless. The ecological perspective opens the fields of disability studies and special education to new theoretical and empirical possibilities.

Originality/value – Two epistemological models are described as new frameworks in disability studies: the Ecological Model of Disabilities and the Ecoducation Model for Special Education. Both are original models that look into the education and inclusion of the person with disabilities.

Keywords Ecology, Special education, Ecoducation, Bronfenbrenner, Bateson, Disability studies, Systems theory

Paper type Conceptual paper

Introduction

“You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete,” said Buckminster Fuller (YouTube, 2008), an American architect, systems theorist and inventor. This study introduces an ecological framework for disabilities meant to provide a new model of viewing and learning about

© Gabriela Walker. Published in *Journal of Research in Innovative Teaching & Learning*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licences/by/4.0/legalcode>



disabilities and special education. This model projects a multi-systemic view of factors that influence a person's life, where people with disabilities are active actors in the development of the world. The increased awareness about interconnectedness, globalization, inter- and trans-disciplinarity, influences on human experience, greening, sustainability, inequality, inequity and lack of opportunities is shifting how people think about potential and growth.

This study first describes the term of ecology and related concepts, then focuses on Bronfenbrenner and Bateson's theories of ecology as a framework of learning about development, followed by an exposure on the human ecology discourse and the hypothesis of ecologism as an epistemology. Following this well-documented literature review, two models are described further: the Ecological Model of Disabilities, as a framework; and the Ecoducation Model for Special Education, looking into the education of the person with disabilities under the new ecological framework.

The "eco" concept

The derivation of the English meaning of the prefix "eco" is based on the Latin "oeco" and the Greek "oikos" meaning "house", "household" or "dwelling place." Greeks and Romans used some aspects of the idea of ecology (e.g. "nature's balance" - Herodotos, or "species characteristics are diverse to ensure their survival" - Plato and Herodotos) since antiquity, as outlined in Egerton's book *Roots of ecology: Antiquity to Haeckel*, but it was Ernst Haeckel who coined the term 'oecologie' (oikos-logos) in 1866 to describe the relationship of living organisms to their environment (Egerton, 2012). The ecological field operates with principles from the theories of physics and sociology (i.e. natural laws) exemplified before, such as cyclicity and succession, dynamicity, systemic integration, hierarchy, interaction and interdependence, evolution, complexity, adaptation, difference and diversity, and further develops the following terminology relevant to the ecological framework of disabilities: ecosystem, population, ecodeme, niche and stigmergy.

The term ecosystem refers to a network of organisms that form a unitary, responsive and dynamic system. "Some systems develop gradually, steadily becoming more highly integrated and more delicately adjusted in equilibrium. The ecosystems are of this kind, and the normal autogenic succession is a progress towards greater integration and stability" (Tansley, 1935, p. 300). Cullen *et al.* (2006, p. 25) explained the systems theory as follows:

The root meaning of the word "system" is the Greek 'synhistanai', which literally means "to place together." Understanding things systemically means putting them into context to establish the nature of their relationships. (. . .).

A key characteristic of the organization of living organisms is the tendency to form multi-levelled structures of systems within systems, referred to as hierarchies. Hierarchy, in this sense, has a different meaning than is typically thought of in organizations; in nature, there is no "above and below" so much as networks within other networks. Connectedness, relationships, and context are fundamental to understanding systems theory.

An ecodeme refers to a stratus of population occupying any specified ecological habitat (Oceanography Dictionary, 2010). In regards to the concept of niche, the definition introduced by Hutchinson (1957) is particularly widespread and useful: "The niche is the set of biotic and abiotic conditions in which a species is able to persist and maintain stable population sizes" (Hutchinson, 1957; Wiens and Graham, 2005). In socio-ecological behaviorism, the terms niche and ecodeme gain a parallel connotation. "An ecological niche implies both interaction and location. An ecodeme is a population occupying a particular ecological niche" (Kauffman *et al.*, 1995, p. 329). Social and behavioral scientists are concerned with survival and how the quality of human life of an individual or group is altered by someone occupying a given niche

and how humans create and maintain ecodemes and niches for themselves and others. The idea of stigmergy is based on Pierre-Paul Grassé's "social appetite" that a social insect possesses an inherent desire to seek its nestmates (Theraulaz and Bonabeau, 1999), and denotes an indirect communication and coordination between social individuals, where the self-regulation of the individuals and of the labor is regulated by the building itself (hence the root of the term: "ergon," which means "work" in Greek; and "stigma" meaning "stimulus") (Heylighen, 2007). In other words, by modifying their environment, individual parts of a system indirectly communicate and coordinate for a common goal. Similarly, a stigmergic organization within and among the networks corresponding to the levels of the ecological model (but especially more so at the individual level fading out toward the macrosystem level) is applicable for human beings, as complex social and adaptive systems. School systems can also be an example of stigmergic organization.

Human ecology

The idea of human ecology has permeated the behavioral, cognitive and social sciences for close to a century. Barker and Wright (1949) examined the place of ecology in psychology as the home or habitat of behavior seen in two general domains: (a) the life-space, or one's personal environment (including intrapersonal, where a change in one behavior results in changes in other related behaviors); and (b) the broader physical, geographical, political, social and so forth human conditions (also in Barker, 1968; Barker and Schoggen, 1973).

Ostrom *et al.* (2008) discussed the cosmology of postmodern adult education from a phenomenological point of view, looking at the importance of autopoiesis, that is self-creation, of each individual in order to become a better competitor on the global job-market. Zachar (2000) applies the distinction between natural or essentialist and practical classifications to disability and psychiatric disorders, concluding that an essentialist label is "scientifically malignant" (p. 169) when used in this context. Particularly important for the Ecological Model of Disabilities and special education was Bateson's [9] emphasis on *difference*, as an "energy relation" (p. 458). It is *difference* that makes us distinguish between territory and map, between paper and wood; it is difference that fuels neural transmission of information, and it is the difference in physical forces that hammer a nail. Bateson argues that "the system shall operate with and upon differences" (p. 490). Using this perspective, I argue that it is *the differences between human abilities* that contribute to the adaptation of the system and within systems. For example, a world of only carpenters or only lawyers would not function adaptively and regeneratively. The difference of capabilities makes the human ecosystem flexible, interconnected and sustainable.

Urie Bronfenbrenner's and Gregory Bateson's theories on ecology as a framework

"Ecology," Bateson said, "in the widest sense, turns out to be the study of the interaction and survival of ideas and programs (i.e. differences, complexes of differences, etc.) in circuits" (1987, p. 491). Gregory Bateson describes his book *Ecology of Mind* as proposing "a new way of thinking about ideas and about those aggregates of ideas which I call 'minds'. This way of thinking I call 'ecology of mind', or the 'ecology of ideas'. It is a science which does not exist as an organized body of theory or knowledge" (1987, reprinted in 2000, p. xxiii). When describing the framework of ecology, Bateson sets up the stage for using multiple lenses, while having at the forefront interaction and sustainability.

Bronfenbrenner (1979), on the other hand, developed a model system for understanding human ecology, starting from the (1) *microsystem* representing "a pattern of activities, social

roles, and interpersonal relations experienced by the developing person in a given face-to-face setting” (Bronfenbrenner, 1994, p. 1644) such as family, school peer group and workplace; to the (2) *mesosystem* encapsulating “interpersonal structures in the form of dyads and N+2 systems” (Bronfenbrenner, 1979, p. 209), where both settings contain the developing person; (3) the *exosystem* consisting of two or more settings, of which at least one does not contain the developing person (Bronfenbrenner, 1994); to the (4) *macrosystem* referring to cultures and subcultures (“a societal blueprint”) (Bronfenbrenner, 1994, p. 1645); and to the (5) *chronosystem* referring to the passing of historical time. “The ecological environment is conceived as a set of nested structures, each inside the next, like a set of Russian dolls” (Bronfenbrenner, 1979, p. 3), in which “environments are not distinguished by reference to linear variables but are analyzed in systems terms” (p. 5), that is, multi-systemic, including a focus on proximal processes.

The ecological framework’s “unit of survival is *organism plus environment*” (Bateson, 1987, p. 491). Bronfenbrenner (1979) also emphasized the dynamics between the individual and his surroundings by including in his theory of the ecology of human development Kurt Lewin’s equation of personality: $B = f(P,E)$, describing that one’s behavior is a function of (i.e. depends on) the person and his/her environment (Lewin, 1935, p. 73, as cited in Bronfenbrenner, 1979). Ecologization, thus, is based on consequential thinking, which focuses on the potentiality of one’s decisions and their consequences, that is, it takes into consideration the impact that human action has on the surrounding settings (natural, political, economic and so on).

Ecology as epistemology: ecologism

Without particularly articulating it, Bateson and Bronfenbrenner set up ecology as an epistemology, a discourse of and about knowledge, a view on knowledge, a way of knowing, a perspective on things, a framework. Thus, *ecologism* is a perspective or framework that seeks to view the birth of true knowledge as the result of continuous relationships among units and multilevel supra-units. Under this view, the individual is the result of previous interactions expressed in genotype and phenotype, as well as in a state of continuous becoming, as part of supra-units and subunits, while still maintaining its own integrity. Nothing exists in a vacuum. Knowledge and understanding can only come about when observing something in relation to something else. Further, something cannot evolve by and in itself, but only as part of and in interaction with something else.

Ecological frameworks are established in other fields, such as biological sciences, economics, social work, health, psychology, but not yet in disability studies. In the fields of political and economic ecology, the presence of environmental issues is required. However, when the term “ecology” becomes an adjective, for example in ecological economics, *ecology* evolves into a philosophical framework that transcends both fields and becomes focused on “the interdependence and coevolution of human economies and natural ecosystems over time and space” (Xepapadeas, 2018). Socioecological psychology is preoccupied with how human thinking, and behavior is influenced by environmental factors (Nauert, 2015). Arne Naess’ notion of ecosophy, outlined in 1972 at the Third World Future Research Conference in Bucharest, targets “a philosophy of ecological harmony or equilibrium” (Drengson and Inoue, 1995, p. 8), with characteristics of openness, due to differences in facts, visions and value priorities, but also targeting “policy wisdom, prescription, not only scientific description and prediction” (p. 8). Felix Guattari’s conception of ecosophy is built on Bateson’s (1987) interdisciplinary “ecology of mind” and emphasizes the interdependence between human and natural environments: “without modifications to the social and material environment, there can be no change in mentalities” (Guattari, 2000, p. 27).

The ecology of disabilities: the Ecological Model of Disabilities for disability studies

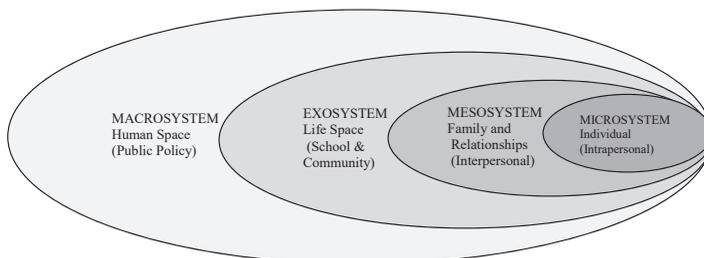
Levels of ecology for people with disabilities

The Ecological Model of Disabilities is based on Bronfenbrenner's prototype of human ecology, emphasizing proximal processes, that is, emphasizing interaction between the system's levels. In the current model, the interaction extends to dynamicity among all levels, in which freeform-like subsystems interact with all the other subsystems, not only with the one(s) in their proximity. Building upon the concepts of ecology of [Barker and Wright \(1949\)](#), [Bronfenbrenner \(1979\)](#) and [Kauffman and Hallahan \(1997\)](#), the following levels emerge: (a) human space, which encompasses the broad societal, political, economic, physical and legislative environments; (b) life-space, referring to the school and community in which the person with disabilities lives; (c) family and relations or interpersonal, which includes family, friends and intimate relations; and (d) individual or intrapersonal, which encompasses attitudes, knowledge and skills of the person with disabilities. These spaces, however, are organized as a meta-system, resembling Bronfenbrenner's later-career model, as opposed to the earlier nested model, resembling the organization of a super-system. [Palmer \(2017, p. 1\)](#) explains the difference between these two notions:

The meta-systems are distinguished from super systems which are nested levels of systems. A meta-system is a deconstructed super-system and appears as a field out of which systems arise and through which they interoperate and cooperate. A meta-system is an environment or ecosystem for a certain level of system or anti-system pair.

This model functions as a "complex adaptive system," a term coined by John [Holland \(2006, p. 1\)](#) and defined as "systems that have a large numbers of components, often called agents, that interact and adapt or learn." But because the disability ecological framework does respond to and accumulates information, it is, in addition, an *open* system. Hence, the framework for inclusion of people with disabilities and the one related to the construction of disabilities is an *open complex adaptive meta-system* (see [Figure 1](#)).

Human space (public policy and society). The human space in which the phenomenon of disability takes place is described in the sociocultural, policymaking, juridical, economic and geopolitical contexts. [Kauffman et al. \(1995\)](#) spoke to the interconnectedness among the actors that influence disability: "Educators and social scientists with an ecological bent are interested in the development and structure of human communities and the ways in which the presence of individuals with certain behavioral characteristics alters the pattern, rhythm, or course of social interactions or relationships" (p. 329). However, this framing of the ecology of disabilities theory goes beyond the community, and targets the quantity and quality of interactions that affect growth in the individual at the overall society (both national and global), through the perspective of historical events. [Bateson \(1987/2000\)](#) defines a "healthy



Source(s): Figure by author

Figure 1.
The Ecological Model
of Disabilities, based on
Bronfenbrenner's
classical socio-
ecological model

ecology of human civilization” as a “single system of *environment combined with high human civilization* in which the flexibility of the civilization shall match that of the environment to create an ongoing complex system, open-ended for slow change of even basic . . . characteristics” (emphasis in the original, p. 502). His daughter, Mary Catherine Bateson, went on to explain that the habits of mind in need of changing and transformation are the following: “the short term solutions that worsen the problem over time (. . .); the focus on individual persons or organisms or even species, seen in isolation; the tendency to let technological possibility or economic indicators replace reflection; the effort to maximize single variables (like profit) rather than optimizing the relationship among a complex set of variables” (Bateson, 2000, p. xiv). Hence, an out-of-the-box type of thinking is needed to change these habits of mind along the lines of finding long-term sustainable solutions and developing a non-isolational perspective and reflective thinking.

A real change in patterns of thought and behavior cannot be done only at the level of governmental agencies, without the cooperation of nongovernmental organizations and private companies. Policymakers and advocates for disability rights are the ones that can bring about changes in human space realm that would positively impact people with disabilities. The national judicial systems and other administrative entities need to work to catch up with the international legislation on disability rights and, consequently, tailor such policies to their national resources and realities. Governments need to be financially and logistically ready to comply with future judicial rulings in the favor of people with disabilities (e.g. public transportation, public parking, access in public buildings, employment, education in least restrictive environment, employment of paraprofessionals). International and domestic policies regarding disability rights emphasize equal opportunity, but do not ensure equal success in school or life. More inclusive knowledge communities produce better theoretical frameworks and more extensive and accurate policies that, in turn, improve more lives. There is a continuous cycle of interplay among theory, research and practice that parallels a synergy of working, monitoring, evaluating, intervention and prevention of disabilities.

Life space (school and community). The life-space represents “the world as it exists for the person and as it affects behavior” (Barker and Wright, 1949, p. 132) and is described through a look at the institutional arrangement, social environment and the educational process itself in and through which the child develops through social interaction and education. We cannot talk about *community* without incorporating all the people, including the most in need of support, and we should not forget that social norms from a community influence allocations of roles of its members. Changing the conditions in the existing institutions where people with disabilities are cared for and educated is imperative for the population with disabilities. The concept of universal design started in architecture, with the work of Mace (2017), when he took into account the access needs of the broadest range of users in public spaces during the inception phase of the architectural projects. Soon after, the idea of universal design for learning (UDL) was developed, which envisions a curriculum anticipating subtle adaptations, which address multiple and unique learning modalities by scaffolding and using multiple instructional approaches. The concept of universal design is directly compatible with the Ecological Model of Disabilities, as it addresses the needs of all members of society within the given physical and sociocultural environment.

In this life space, the danger of homogenizing the skills of people with disabilities is real, by fostering limited or limiting processes. Kauffman (1993) advocates for disaggregation of disabilities, in the sense that each category of impairment, down to each individual, needs to be viewed and intervened upon separately, with unique strengths and vulnerabilities.

When employing the ecological model in a classroom, one needs to consider the environmental systems the students are immersed in, understand the connections between school and families, recognize the importance of the student’s background (such as culture,

socioeconomic status, language, religion), as well as supports that each student may need during the learning process, together with any necessary naturalistic materials, methods and adaptations.

Albert R. Marston (1979) wrote that the field of behavior modification is ready to expand its theoretical and professional base to one which can be described as *behavioral ecology*:

At each level of operation, from individual therapy to broad social applications, behavioral change involves complex rearrangements in the systems surrounding the focal behavior. While symptom substitution in the psychodynamic sense may not be demonstrated, each therapeutic intervention produces a variety of effects both within the person and in his interpersonal network. At the broad social level, behavior modifiers who consider applications of their methods to such problems as population control also need to consider the complex systems effects in any decision to focus on a particular behavior (p. 147).

This ecological view on behavior is substantiated by research that gains increasing ground. For example, Graham (2008) contends that schooling, along with an overemphasis on television, video games, food additives, parenting praxis, discipline practices and so on, contributes to forming scattered attention patterns in developing children:

the influence that the discourses and practices of schooling might bring to bear upon the constitution of 'disorderly behavior' and subsequent recognition of particular children as a particular kind of 'disorderly' (p. 7).

Behavioral ecology principles entered the school and community space in other various forms, shaping the curriculum and the learning processes: naturalistic teaching materials; reinforcing and punishing stimuli; generalization and maintenance environments; motivational choice making; pace of cuing and prompting; degree to which the level of instruction matches student's current behaviors; ecological structuring of learning; and inclusive settings in which instruction takes place (Wolery and Schuster, 1997). Further, Wolery and Schuster (1997) pointed out that much work remains to be done, prioritizing the following areas: structure of instruction, instruction setting, motivation-enhancing variables and modalities of delivering instructional methods. In response, Brown (1997) observed that a broadening of the research in special education would not be sufficient, but that a paradigm shift would be desired. Such a paradigm shift could be provided by the Ecological Model of Disabilities, by heavily emphasizing naturalistic and personalized variables.

Equity rather than equality should be targeted in inclusive discourses and practices. To date, the discussion of inclusion has been rather focused on the benefits of bringing awareness about inclusion of people with disabilities during adulthood (for example, correcting one's behavior in high school or in the workplace). However, if children learn to understand, value and preserve diversity, unique abilities (including forms of overcompensation of shortcomings, or splinter skills), freedom, physical and mental health and other issues related to the human experience, since early age, then inclusion would be a natural phenomenon. These values should pervade one's environments since the early childhood, and be continuously reinforced at home and in school. Breaking the cycle of devaluing difference can originate at the school management level. Transformational leadership refers to organizational goals, while transformative leadership refers to methods to achieve emancipation, democracy, justice and equity, decentralization of power and morality. Therefore, the latter concept is fitter for the Ecological Model for Disabilities.

Transformation, disability rights, connection with sustainable goals and progress are principles to help policymakers and practitioners question, reenvision and reflect on our environments and on the processes of being, doing and having. Within an ecological framework, policymakers, administrators, teachers and parents need not resume their

responsibilities to placement and advocacy, but their work should be consistent throughout the education process and beyond. “It is therefore important for a leader to ensure that educators envision a purpose beyond that of having all students (and groups of students) meet expectations on annual standardized tests” (Kose and Shields, 2010, p. 11). Educators and educational leaders need to enter a frame of mind where education focuses on providing instruction for *today* and *tomorrow*, and one that considers the *ecospace* or *niche* a person will occupy in society after graduation.

Family and relations (interpersonal). As with all human beings, close network support is also crucial for people with disabilities, possibly determining the future development of the person. Family resources, such as financial resources, values, attitudes, habits and emotional support, can foster or impede the preparedness for schooling, the learning process and individual harmonious development of the person with disabilities. It is the family and caregivers that should contribute to the functional skills of their children, as targeted in the Individualized Educational and the Transition Plans (IEPs and ITPs). It is the family and caregivers that should serve as models in life for the children with disabilities, and it is them who are expected to advocate on the behalf of their offspring with disabilities. It is families that can be excluded from communities because of the disability event in their life, but it is also their course of action that could change the lives, not only of their protected persons in need, but also the course of lives of smaller and larger communities.

Individual agency and development (intrapersonal). The fourth level of the Ecological Model of Disabilities is the individual person and its own, self-propelled personal agency. Bateson (2000) reminded us about her father’s urge that “the process of systemic adjustment would require self-observation and self-knowledge” (p. viii), giving us a measure of the importance of the intrapersonal labor.

On an individual level, the historically marginalized populations are still disempowered and disentitled. The current status quo of disempowerment resulted partially from the lack of knowledge and awareness about the diverse needs of people with disabilities, as well as from a lack of opportunity to change the system of service delivery. Grassroots movements in the fields of disability rights are welcomed.

Principles of the ecology of disabilities model

The conditions for the Ecological Model of Disabilities to emerge are propitious, as there have been previous attempts to connect elements of the situation of people with disabilities with the ecological model, in published works discussing de-institutionalization and integration in community (Berry, 1995); or in discussing social participation of children with disabilities in inclusive preschool programs (Tsao *et al.*, 2008); or in adopting an ecological model to preventing sexual abuse in special education (Skarbek *et al.*, 2009). Kauffman and Hallahan (1997) discussed the least restricted environment (LRE) “placement as a problem of social ecology” (p. 325), explaining that in the 21st century special education has no “holy place” or “promised land.” Shogren *et al.* (2009) adopted an ecological perspective when discussing the social factors and core principles that influence and guide public policy for people with intellectual disability. However, no previous work has systematically set a frame for an Ecological Model of Disabilities.

Similar to other ecological scientific fields pointed out in the previous section, the ecological approach is inherently both interdisciplinary and transdisciplinary, where situated knowledge producers contribute to the theoretical and practical improvement of a given situation. The Ecological Model of Disabilities borrows from other frameworks involving ecological thought, and it subscribes to the category of “contextualist theories” that “hold development to be the emergent property of the intersection of individual and context, where context is viewed both spatially and temporally” (Tudge, 2008). The Ecological Model of

Disabilities proposes that the person is at the center of its own universe, a self-organizing system, with unique characteristics that can influence and even create other systems (e.g. a happy person may make other people smile). The following principles set the basis and essence of the ecology of disabilities framework:

- (1) *Interdisciplinary and, outstandingly, transdisciplinary.* Given that disability itself has an interdisciplinary discourse, being described and researched by multiple disciplines, such as medicine, psychology, educational psychology, special education and health sciences, the field of ecology of disabilities is also both interdisciplinary and transdisciplinary. The interdisciplinary condition comes about with the influences of a variety of fields, including all of those mentioned plus ecology (e.g. when referring to environmental influences), cybernetics (e.g. chaos and systems theory), philosophy (e.g. how knowledge and the self are created), sociology, cultural studies, economy, politics, policy studies (e.g. social fabric of influences on people with disabilities, and their actions), but remaining within the bounds of the disciplinary research, in this case disability studies. The transdisciplinarity implies an “in-between” state, as originally introduced by Jean Piaget in 1970, forming a dynamic unity of knowledge beyond disciplines – a discipline in itself.
- (2) *Permeable and flexible.* Through the possibility of incorporating interdisciplinary concepts and methods, and constantly redefining itself as a transdisciplinary field, the Ecological Model of Disabilities remains open to endless possibilities, conforming to evolving theory and practice, concepts and realities, logics and phenomenology;
- (3) *Complex and connected.* The ecology of disabilities field functions as a complex system and allows for bottom-up and top-down organization and agency, allowing for multiple levels of stigmurgy. Connectivity is inherent in a complex, network-like system, within and among the multiple unities situated at different hierarchical levels. Active participation at each level and transcending levels of the stakeholders are essential to the ecological system (of disability). Putnam (1995) states that horizontal networks are fundamental to civil society and are based on reciprocity, such as democratic societies.
- (4) *Five-leveled.* The model has at its center a system of four levels: (1) the individual is a system in itself (microsystem), (2) family and relationships (mesosystem), (3) life-space (exosystem), (4) human space (macrosystem), all developing under the aegis of (5) time (chronos, chronosystem) (see principle 6);
- (5) *Value-laden and glocal.* In order for the ecological approach to be valuable and functional, it is necessarily entrenched in the culture of the region, country or organization it is implemented in or through. For example, if a certain religion or tradition is essential for the population the ecological model is applied, then those values which do not trespass the central ecological principles should be locally incorporated. Ultimately, the ecological framework of disabilities will be ideally implemented globally;
- (6) *Located in space and time.* This model cannot escape the social, political and economic space- and time-related circumstances. However, due to its complexity and range of issues it covers in disability studies, it both subjectifies and objectifies the social and natural environments, being capable of extracting generalizations and, thus, not deviating from its core general elements and principles;

-
- (7) *Human rights-based*. The respect for human beings and their rights, including the right to education and development, and respect for the rule of law and democracy are core elements for the Ecological Model of Disabilities;
 - (8) *Democratic*. The individuals with disabilities need to be free to make informed decisions about their lives. Skrtic (1991) urges for a new perspective at the special education system as a non-rational and non-just solution to the matter of disability to allow progress. He advocates for “adhocracy,” which allows for innovation, as opposed to standardization. Only then the institution of school can become “a problem-solving organization configured to invent new programs” (p. 182) and a democratic body;
 - (9) *Diverse*. Appreciation for natural, cultural and any other form of diversity leads to honoring and reframing unique abilities, cross-culturalism (bridging the differences between cultures), multiculturalism (the coexistence of two or more cultures within a unit, such as an organization or even a person), gender differences and so forth.
 - (10) *Just*. The Ecological Model of Disabilities focuses on equity and social justice (based on human rights) to allow for multiple levels of participation in the system. However, this framework transcends social justice and implies symbiotic relationships, concern for others, morality and ethics;
 - (11) *Harmonious*. Coleman notes that the quality of relationships among individuals determines the harmonization of functions of social institutions. Hence, the greater the pool of social capital, the larger and more complex social networks and institutions there are in that community (Coleman, 1990). Equilibrium and harmonious development within and among levels of the human and natural ecosystems provide space for the flow of physical and social energy and materials, synchronization, coordination and collaboration of actions;
 - (12) *Descriptive and prescriptive*. As an open transdisciplinary field, the ecology of disabilities will receive much contribution from narratives of reality, as well as futuristic projections and philosophical thought;
 - (13) *Generating policy wisdom*. Based on the prioritizing of values to the people with disability and their self-realization, on the existing empirical knowledge about methods of prevention and intervention, on the cross-applications from other fields and on intuitive insights on the status of each ecological level as well as the statuses of relationships among levels, policy will be drawn. A deep understanding of disability issues and of the ecological system will contribute to bridging between good policy and policy wisdom;
 - (14) *Metamorphic*. The ecological framework of disabilities is ultimately seeking changes in mentalities and transformations in the patterns of thought and behaviors for desired adaptations and accommodations to an evolving objective reality.
 - (15) *Sustainable realization and development*. Incorporating the ecological account into the ecology of disabilities, self-realization (autopoiesis), innovation and sustainable development is supported at the individual, organizational, national and global levels;

A definition of the Ecological Model of Disabilities depends on the development or evolution over time of the concept of disabilities, and, due to the biological nature of disability, advancements in biomedicine regarding corrections of biophysiological impairments, as well as advancements in all other contributing fields; hence, this discipline is bound to remain an

open and ever-evolving field. It ultimately targets a change in mentalities, or, as [Bateson \(1987\)](#) puts it, “the reconstruction of patterns of thought” to allow development, sustainability, freedom and justice. The ecological framework of disabilities is idealistic, but it also has practical implications, as it is meant to set the standards for providing people with disabilities with just consideration and empowerment.

Developing an
ecology of
disabilities
framework

Education under the ecology of disabilities framework: The integrated special education ecology model (the Ecoducation Model)

The education of people with disabilities should ultimately target improving their chances of claiming their rights, contributing to society and accomplishing their full potential through the provision of education and meeting the requirements of sustainable employment and fulfillment of long-term goals. The Ecoducation Model is comprised of the following levels: (1) endoducation at its center, (2) mesoducation, (3) periducation, (4) epiducation and (5) macroducation. *Endoducation* is focused on the very purpose of providing education or accessing education – the right to education. The process of endoducation is mandated by legislation, such as IDEA, through the concepts of Free Appropriate Education (FAPE) and Least Restrictive Environment (LRE) placement. *Mesoducation* is focused on intermediate educational goals, such as getting a passing grade, or learning about water. *Periducation* refers to the process of education itself, and it is circumstantial. It refers to learning through formal education, as long as applicable and transferable skills are formed to serve adaptation. However, education should focus on the *ultimate goals* for that person of self-creating and self-realization, mostly in terms of career identity. It is the *epiducation* that subsumes the overall (ultimate) goals of “why we learn”. Perhaps our personal epiducation goals are to become a firefighter or an accountant. The prefix *epi* describes the fact that educators need to build *upon* previously known knowledge (scaffolding), hence the concept of *epiducation* (from the Latin words *epi-* which means “on”, “upon”; and *duco -ere* meaning “to lead” and “to guide”). Secondly, the prefix *epi* can also refer to the Epicurean philosophy of reaching happiness and tranquility in one’s life through *aponia* (the absence of pain and fear). In this sense, the term *epiducation* has double and related meanings: that of focusing on long-term individual goals, and that of mediating toward the attainment of an accomplished and happy life. Epiducation can be seen as the entire K-12 to tertiary education system. Learning from life experiences, outside the formal school system, subscribes under *macroducation*, and is meant to form the individual as a whole, capable of functioning in all environments the person lives in, and conclusively become a productive citizen of society. Macroducation encompasses learning moral and ethical values (see [Figure 2](#)).

The Ecoducation Model for Special Education is connected with the understanding of *disability*. The ecologization of education looks not only into how the individual can meet the demands of the market, but will also treat the individual as a whole and strive to assist him achieve a personal “wholeness”. The labor market is looking for transferable skills that cannot be directly taught and learned through formal education. Such pivotal abilities, like flexibility and adaptability for easing the transferability of owned skills, dedication, innovation, problem-solving and creativity, can only be achieved through a holistic approach of personal development.

The Ecoducation Model for Special Education targets the development of the individual as a part of the family, community, nation and extended human networks. The need for inclusive development, entrepreneurship and sustainable development calls for changes in the make-up and education of global biopower that come together in the ecological model for the education of people with disabilities, that is, ecoducation for people with disabilities. Ecoducation emphasizes, at the individual level, the best use of abilities for achieving *autopoiesis*, sustainable employment, personal autonomy and independence. At the

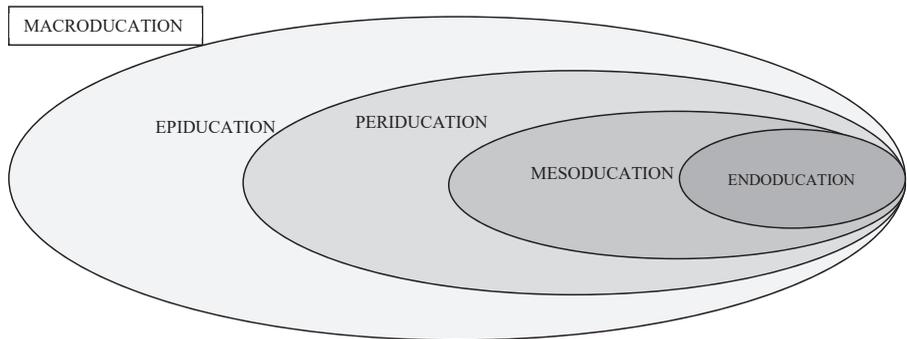


Figure 2. The integrated special education ecological model, where the formal school system is comprised of endoducation, mesoducation, periducation and epiducation

- Note(s):**
1. ENDODUCATION – the very purpose of providing education or accessing education;
 2. MESODUCATION – intermediate educational goals, such as getting a passing grade, or learning about water;
 3. PERIDUCATION – the process of education itself;
 4. EPIDUCATION - long-term individual goals, mediating towards the attainment of an accomplished and happy life; the K-12 or K-tertiary education system;
 5. MACROEDUCATION – learning from life experiences, outside the formal school system

Source(s): Figure by author

school-wide, community and international levels, ecoducation regulates (a) a natural flow of human knowledge and human capital among the educational systems, that is different tiers and levels of education; (b) the transformation of human skill into the next best functional use; and (c) adoption, accommodation and adaptation of the incoming flows of human knowledge capital so that a balanced relationship among the members of society be achieved. Hence, ecoducation focuses on the ecology and management of human knowledge and skills at all levels of the ecological model, and how it harmonizes with the rest of the ecological spheres. Ecoducation is meant to maximize students' potential as opposed to preparing people in conformity with their opportunities in life and with their status. On the contrary, students with disabilities should be educated commensurate to both their needs and goals in life, as well as provided with equitable opportunities to achieve self-actualization.

Opportunity is a key word, which implies reforming the current schooling system to a more open and practical-oriented system of education, a behavior-responsive and feedback-incorporating education. The educational and employment laws that are in place today advocate for an opportunity to equal benefits, but they do not ensure equal success. Special education today needs to provide more than accessibility. A reformed schooling system would provide students with entitlement and empowerment, which are the most important factors that help poor people to rise above poverty (Amartya Sen, the Nobel laureate in economics of 1998, as cited in [Gutierrez, 2006](#)), as well as the most important factors to help people with special needs achieve a better life.

However, providing opportunity implies reforming the current schooling system to a more open and pragmatic-oriented system of education, and a behavior-responsive and feedback-incorporating education. The educational and employment laws that are in place today advocate for an opportunity to equal benefits, but they do not ensure equal success. Indeed, the discourse of education currently tends to be isolated from the broader framework of life, which [Kose and Shields \(2010\)](#) also point out.

The practical ecology of disabilities is to stop children from playing the game of schooling and to teach them how to create and recreate themselves. Epiducation provides intrinsic motivation and sets the base for entitlement and empowerment in one's life. For the implementation of the ecologic model of education, that is one based on the skills needed for the person to be successful in life (whatever that means for the child, either college or employment), we need to ask ourselves what the higher goal for a superior benefit to the person we are educating or treating is. The answer to this question should drive the overarching goal of student's life-long education and student's individual autopoiesis. An ecological approach to placement recognizes the complexity, variety and purposes of social systems, and an ecoducational model would take into account modes of prevention, social acceptability, as well as educational methods of intervention. This way, the corpus of human capital will be utilized, and the ecodeme of individuals with disabilities will enter into an ecological sync with the society they belong to, instead of being lost to society.

The ecological model of education emphasizes the need to rechannel students' (with disabilities) energies on the long-term goals and prepare them for their adult future through the assistance of behavior and cognitive management and through individualized strategies that are based on age-appropriate and developmental skill advancement. Because disabilities often occur in a comorbid context (i.e. multiple diagnoses), it is all the more important to focus on practicality and to believe that constructivism is part of human nature. The early rechanneling of disabilities toward real-life skills would be an engaging ecologic solution, so that each member of this segment of society (ecodeme) could find their niche in today's globalized system. Pivotal skills need be taught throughout school, especially for children with disabilities because their behavior is more likely to be influenced by environmental factors. If disabilities have best been successfully approached with treatments combining parental skill training, therapy for the child, applied behavior analysis and such methods specific to the special education field, an attempt to adopt a broader approach to disability by raising awareness across societal systems would be beneficial.

Policymakers, educators, administrators and the general public should have on their agendas discussions on laws and practices to help the persons with special needs rise from poverty, to combat gender-specific and ethnic inequalities, to stop discrimination (e.g. manifested through the overrepresentation of males and minorities in special education high-incidence programs), to better provide timely and accessible child health care, to provide better universal education to all children and to integrate the special needs ecodeme into the sustainable development system of their country through ecoducation and ecoemployment. The Ecoducation Model has the ability to foster multiple changes for people with disabilities.

Conclusions

This study aimed to contribute to the theoretical integration of ecological principles in the field of disabilities and special education. The Ecoducation Model for Special Education is specific to the education of children and adults with disabilities, and it is directly compatible with the broader Ecological Model of Disabilities. These ecological models can be applied to all levels of the ecological system, and to different ecodemes of population, hence, the aforementioned recommendations are not exclusive to a country or the disability context. Nevertheless, the ecological models need to be locally implemented, with general principles tailored to national traditions, laws and resources.

The principles outlined in the ecological framework of disabilities and the Ecoducation Model for Special Education call for a unified effort to improve the quality of life for the ecodeme with disabilities. Advocating for the pursuit of individual well-being within the larger society, both models call for practical changes in a multitude of areas, including legislation and policy, training of professional personnel, sufficient financial input in

programs designed for the care of children and adults with disabilities, change in societal mentalities to fight discrimination, disempowerment and isolation. Because the scope of ecological frameworks is incommensurate, being both interdisciplinary and transdisciplinary, further research possibilities are countless. The ecological perspective opens the fields of disability studies and special education to new theoretical and empirical possibilities.

References

- Barker, R.G. (1968), *Ecological Psychology*, Stanford University Press, Stanford, CA.
- Barker, R.G. and Schoggen, P. (1973), *Qualities of Community Life*, Josey-Bass, San Francisco, CA.
- Barker, R.G. and Wright, H.F. (1949), "Psychological ecology and the problem of psychological development", *Child Development*, Vol. 20 No. 3, pp. 131-143.
- Bateson, G. (1987), "Ecology and flexibility in an urban civilization", in Bateson, G. (Ed.), *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology*, pp. 502-513. Northvale, NJ: Jason Aronson Inc. Reprinted with a forward by Mary Catherine Bateson (2000), Chicago, IL: University of Chicago Press..
- Berry, J.O. (1995), "Families and deinstitutionalization: an application of Bronfenbrenner's social ecology model", *Journal of Counseling and Development*, Vol. 73, pp. 379-383.
- Bronfenbrenner, U. (1979), *The Ecology of Human Development: Experiments by Nature and Design*, Harvard University Press, Cambridge, MA.
- Bronfenbrenner, U. (1994), "Ecological models of human development", in Husen, T. and Postlethwaite, T.N. (Eds), *International Encyclopedia of Education*, 2nd ed., Pergamon Press, Oxford, UK, Vol. 3, pp. 1643-1647.
- Brown, F. (1997), "Responses to Wolery and schuster", *The Journal of Special Education*, Vol. 31, pp. 80-81.
- Coleman, J. (1990), *Foundations of Social Theory*, The Belknap Press of Harvard University Press, Cambridge, MA.
- Cullen, E.T., Camm, T.W., Jenkins, F.M. and Mallett, L.G. (2006), *Getting to Zero: the Human Side of Mining*, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Spokane Research Laboratory, Spokane, WA, DHHS, (NIOSH) Publication No. 2006-112, Information Circular 9484, March, 2006; :1-32, available at: <http://www.cdc.gov/niosh/mining/pubs/pdfs/2006-112.pdf>
- Drengson, A. and Inoue, Y. (1995), *The Deep Ecology Movement: an Introductory Anthology*, North Atlantic, Berkeley, CA.
- Egerton, F.N. (2012), *Roots of Ecology: Antiquity to Haeckel*, University of California Press, Berkeley, CA.
- Graham, L. (2008), "From ABCs to ADHD: the role of schooling in the construction of 'behaviour disorder' and production of 'disorderly objects'", *International Journal of Inclusive Education*, Vol. 12, pp. 7-33, available at: http://eprints.qut.edu.au/5447/1/5447_1.pdf
- Guattari, F. (2000), *The Three Ecologies. Translation Ian Pindar and Paul Sutton*, The Athlone Press, London and New Brunswick, NJ.
- Gutierrez, M. (2006), "Why democracies don't have famines", in Stanford, C. (Ed.), *World Hunger. The Reference Shelf*, Vol. 27 No. 5, H. W. Wilson Company, Cypress, TX, 2007.
- Heylighen, F. (2007), "Why is Open Access development so successful? Stigmergic organization and the economics of information", in Lutterbeck, B., Bärwolff, M. and Gehring, R.A. (Eds), *Open Source*, Lehmanns Media, Jahrbuch.
- Holland, J.H. (2006), "Studying complex adaptive systems", *Journal of Systems Science and Complexity*, Vol. 19, pp. 1-8, doi: [10.1007/s11424-006-0001-z](https://doi.org/10.1007/s11424-006-0001-z).

- Hutchinson, G.E. (1957), *A Treatise on Limnology*, Wiley & Sons, New York, NY.
- Kauffman, J.M. (1993), "How we might achieve the radical reform of special education", *Exceptional Children*, Vol. 60, pp. 6-16.
- Kauffman, J.M. and Hallahan, D.P. (1997), "A diversity of restrictive environments: placement as a problem of social ecology", in Lloyd, J., Kameenui, E.J. and Chard, D. (Eds), *Issues in Educating Students with Disabilities*, Erlbaum, Hillsdale, NJ, pp. 325-342.
- Kauffman, J.M., Hallahan, D.P., Astuto, T.A. and Lloyd, J.W. (1995), *Issues in Educational Placement: Students with Emotional and Behavioral Disorders*, Routledge, New York, NY.
- Kose, B.W. and Shields, C.M. (2010), "Ecological and social justice: a leadership framework for sustainability", *International Journal of Environmental, Cultural, Economic and Social Sustainability*, Vol. 6 No. 3, pp. 275-288.
- Lewin, K. (1935), *A Dynamic Theory of Personality*, McGraw-Hill, New York, NY.
- Mace, R.L. (2017), "Universal Design institute: what is universal Design?", available at: <http://www.udinstitute.org/whatisud.php>
- Marston, A.R. (1979), "Behavior ecology emerges from behavior modification: side-steps toward a nonspecial profession", *Behavior Modification*, Vol. 3, pp. 147-160, doi: [10.1177/014544557932001](https://doi.org/10.1177/014544557932001).
- Nauert, R. (2015), "PsychCentral: ecology explains economic and cultural behavior", available at: <http://psychcentral.com/news/2010/08/06/social-ecology-explains-economic-and-cultural-behavior/16518.html>
- Oceanography Dictionary (2010), "Global oneness: oceanography dictionary - ecode", available at: <http://www.experiencefestival.com/a/ecodeme/id/6076735>
- Ostrom, C.S., Martin, W.J. and Zacharis, J. (2008), "Autopoiesis and the cosmology of postmodern adult education", *Adult Education Quarterly*, Vol. 58 No. 4, pp. 299-317.
- Palmer, K.D. (2017), "Intertwining of duality and nonduality", available at: <http://www.isssof2000meet/papers/20163.pdf>
- Putnam, R. (1995), "Bowling alone: America's declining social capital", *Journal of Democracy*, Vol. 1, pp. 65-78.
- Shogren, K.A., Bradley, V.J., Gomez, S.C., Yeager, M.H., Schalock, R.L., Borthwick-Duffy, S., Buntinx, W.H.E., Coulter, D.L., Craig, E.M., Lachapelle, Y., Luckasson, R.A., Reeve, A., Snell, M.E., Sprent, S., Tassé, M.J., Thompson, J.R., Verdugo, M.A. and Wehmeyer, M.L. (2009), "Public policy and the enhancement of desired outcomes for persons with intellectual disability", *Intellectual and Developmental Disabilities*, Vol. 47, pp. 307-319.
- Skarbek, D., Hahn, K. and Parrish, P. (2009), "Stop sexual abuse in special education: an ecological model of prevention and intervention strategies for sexual abuse in special education", *Sexuality and Disability*, Vol. 27, pp. 155-164, doi: [10.1007/s11195-009-9127-y](https://doi.org/10.1007/s11195-009-9127-y).
- Skrtric, T.M. (1991), *Behind Special Education: A Critical Analysis of Professional Culture and School Organization*, Love Publishing Company, Denver, CO.
- Tansley, A.G. (1935), "The use and abuse of vegetational concepts and terms", *Ecology*, Vol. 16, pp. 284-307.
- Theraulaz, G. and Bonabeau, E. (1999), "A brief history of stigmergy", *Artificial Life*, Vol. 5, pp. 97-116.
- Tsao, L., Odom, S.L., Buysse, V., Skinner, M., West, T. and Vitztum-Komaneki, J. (2008), "Social participation of children with disabilities in inclusive preschool programs: program typology and ecological features", *Exceptionality*, Vol. 16, pp. 125-140.
- Tudge, J.R.H. (2008), "A teoria de Urie Bronfenbrenner: Uma teoria contextualista? [Urie Bronfenbrenner's theory: is it contextualist?]", in Moreira, L.V.C. and Carvalho, A.M.A. (Eds), *Família e educação: Olhares da psicologia [Family and education: Perspectives from psychology]*, Paulinas, São Paulo, pp. 209-231.

-
- Wiens, J.J. and Graham, C.H. (2005), "Niche conservatism: integrating evolution, ecology, and conservation biology", *Annual Review of Ecology, Evolution, and Systematics*, Vol. 36, pp. 519-539.
- Wolery, M. and Schuster, J.W. (1997), "Instructional methods with students who have significant disabilities", *The Journal of Special Education*, Vol. 31, pp. 61-79.
- Xepapadeas, A. (2018), *Ecological Economics. The New Palgrave Dictionary of Economics*, 3rd ed., Palgrave MacMillan, Hampshire, UK.
- YouTube (2008), "Buckminster fuller", available at: <https://youtu.be/v7OBTiyMoSE>
- Zachar, P. (2000), "Psychiatric disorders are not natural kinds", *Philosophy, Psychiatry, and Psychology*, No. 7, pp. 167-182.

Further reading

- Bronfenbrenner, U. (1999), "Environments in developmental perspective: theoretical and operational models", in Friedman, S.L. and Wachs, T.D. (Eds), *Measuring Environment across the Life Span: Emerging Methods and Concepts*, American Psychological Association, Washington, DC, pp. 3-28.
- Express News Staff (2010), "'Father of economic ecology' to receive U of A honorary degree", available at: <http://www.ales.ualberta.ca/rr/Renewable%20Resources%20News/2010/09/FatherofeconomicecologytoreceiveUofAhonorarydegree.aspx>
- Sen, A.K. (1999a), *Development as Freedom*, Oxford University Press, Oxford.
- Sen, A.K. (1999b), "Democracy as a universal value", *Journal of Democracy*, Vol. 10 No. 3, pp. 3-17.
- Sen, A.K. (2000), "A decade of human development", *Journal of Human Development*, Vol. 1, pp. 17-23.
- Sen, A.K. (2003), "Development as capability expansion", in Fukuda-Parr, S. and Shiva Kumar, A.K. (Eds), *Readings in Human Development (41-58)*, Oxford University Press, New Delhi and New York, NY.

About the author

Dr Gabriela Walker is a full professor at National University, California. Growing up under communism, when freedoms and available wealth were limited, and crystalizing her personality and knowledge in an advanced democracy, Dr Walker brings a range of perspectives to special education and disability studies. She also worked with the Roma (Gypsy) population with disabilities in an urban setting prior to starting her graduate studies. She obtained her degrees from the University of Illinois at Urbana-Champaign, US, in global policy studies; the University of Georgia, US, in special education; and the University of Bucharest, Romania, in inclusive education and psychology. Dr Walker just ended chairing the Special Education Research Special Interest Group with the international American Educational Research Association (AERA) (2018-9). Current research interests include autism spectrum disorders, methodologies for teaching special populations (including assistive technology), global special educational policies, healthcization and ecology of populations with disabilities, and disability rights. Gabriela Walker can be contacted at: gwalker4illinois@gmail.com