The reality of inclusion in physical education in the Brazilian school system: facts, theories and practice

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Abstract

Our purpose in this article was threefold. First, we attempted to analyze evidences of inclusion in the Brazilian school, and we argued that inclusion still has a long road ahead, particularly in the field of physical education. In relation to inclusion, we used data provided by the Brazilian government itself to demonstrate several issues of concern, including some with educational governing bodies. Second, we examined how the Brazilian physical education national curriculum parameters have been tailored in their pedagogical recommendations to accommodate the "movement culture" approach. Although physical educators endorsed the new curricular directives, their practice in school with inclusion revealed troublesome situations. Overall, they admitted that they did not feel prepared to work with students with disability in their classes, and they feel that they need continuing education, as well as actual administrative/government investments. Third, we introduced concepts from dynamic systems theory to our adapted physical education practice while working with people with disabilities in inclusive settings. We illustrated the theory in its application to the physical education practices by reporting a lifetime of work in outreach programs in the field of adapted physical activity (APA), at São Paulo State University at Rio Claro. The complexities in the practice of inclusive school physical education require a holistic approach, which we feel can be accomplished through the employment of dynamic systems concepts. Whether epistemological directions include the movement culture approach or dynamic systems theory, or a hybrid, these efforts must be sustained by committed teachers, the school system, government leaders, families, and the entire community.

Keywords: Inclusion in physical education; Curriculum and practice; Dynamic systems theory; Adapted Physical Education practice.

Introduction

For many generations of students, physical education (PE) was their favorite class in school. Yet, it was also hated by many, who failed to meet demands of physical performance. Historically, its practice was only for the strong, the agile, the healthy, the able body. Even today, this culture of exclusion seems to dominate PE, preventing coherent pedagogical practice, and, therefore impeding the process of inclusion.

To address the reality of inclusion of people with disability (PWD) in the Brazilian school system, and, in particular, the opportunities for PWD to participate in school PE, we first attempt to provide an overview of the status of education in the school system in the country. Second, we examine how the Brazilian pedagogical approach, the "movement culture," affects PE practice under the inclusion paradigm. Third, we address the complexities of school inclusion in PE in our practical experiences in a lifetime of work in the APE field at São Paulo State University.

The primary importance of practicing physical activity is to ensure quality of life and health. The modern world, in its "globalization glory," is, in fact,

making us lazy and passive consumers of things, services and ideas that promote stereotypes in the name of being "cool" (i.e., thin, muscular, with the "right" body proportions, blond, tall, "sexy". Our modern lifestyle has made us instant gratification seekers, sedentary loners, and (actually) disconnected from ourselves. We eat too much and move too little. A large proportion of Brazilians, including students - even at young ages - is considered sedentary[1]. The World Health Organization[2] revealed that 39% of the people in Latin America and the Caribbean were considered inactive, with 47% inactive Brazilians, the highest percentage in the Region. In school, students' unsatisfactory experiences in PE classes often result in life-lasting sedentary behaviors, affecting health and quality of life in all domains. PWD have an increased risk for poor health due to sedentary lifestyles, lacking in opportunities for sports and exercise[3, 4]. Trends in sedentary behavior have found their way into the PE classroom, where theoretical and distance education courses have begun to flourish, and practical classes are losing popularity. This, of course, has changed the learning experience for the students with disability, as well as for PE teachers in training, and effectively has eliminated opportunities for hands-on experiences.

The starting point of inclusion for education and PE in school

Physical education, exercise and sport activity are major umbrellas for the promotion of development, health, rehabilitation and, in addition, with immeasurable emotional and social benefits[5, 6]. The United States' federal legislation for the education of PWD recognizes the importance of these areas and includes them in the definition of special education as a direct service, mandatory in the Individuals with Disability Improvement Act of 2004, first approved in 1990[7]. Scholars in the United States' educational system and others around the world recognize that not enough has been done in education to protect the rights of all students, and that the inclusion debate must be aligned with exclusion and school evasion, especially in those countries with developing and underdeveloped economies.

International recommendations[a] on health, development, and the general educational needs of PWD are echoed in the written policies and legislation about inclusion in education. Although these policies are intended to be effectively implemented, they seldom are, and lack monitoring via actual field diagnoses, as well as accountability. Such is the case in so many school sectors, as academic reports reveal innumerable complaints, especially from teachers and students themselves, both with and without disabilities[8].

In Brazil, the inclusion debate appears to be confined to education leaders' and scholars' foci on ensuring a holistic and innovative curriculum by considering moral, human rights, and politically correct issues. As important as this goal might be, however, this debate deviates from reality, which instead encompasses scenarios of procrastination, unsustainable teacher attrition, and denial - at all institutional levels (e.g., federal, state, municipal, school, family, and society, in general) and in all levels of representatives (e.g., leaders, administrators, teachers, parents/legal guardians). This reality often is masked by initial measures of success (i.e., official statistical data from agencies, legislative approvals and amendments, corporate financial sponsorships and investments, media interest in novel stories about unique inclusive experiences, etc.), and by well-intended arguments that stress the moral value of the rights of accessibility and of education for all. The merit of advances in the formal instruments of our constitutional system is undeniable, as are discourse and advocacy for diversity and politically correctness. Yet, as noted by Bines and Lei[9], like many other countries around the world, we have just begun to take the "road to inclusion".

All recommendations for inclusive settings from international and local organizations (WHO, UN, UNESCO, World Bank, UNICEF, federal constitutions of countries, and local legislations), strongly warn about the negative effects of exclusion, and note that discrimination is a violation of human rights. With regard to education, a majority of countries around the world have complied formally with the inclusion philosophy, and many have developed detailed instructions (e.g., curricular plans, specific laws and policies) for its implementation in the regular school system. The legacy begun with the *International Year of the Disabled Persons* (IYDP) 1981:

> according to the UN, "The theme of IYDP was 'full participation and equality,' defined as the right of persons with disabilities to take part fully in the life and development of their societies, enjoy living conditions equal to those of other citizens, and have an equal share in improved conditions

resulting from socio-economic development." From this initiative, the UN installed the *World Programme of Action* (WPA), concerning disabled persons, in 1994[11].

Following the rest of the world, most countries in South America adhered to the UN resolution A/RES/61/106 regarding the *Rights of Persons with Disabilities*, signing it on December 13, 2006 (there are continuous updates to the treaty). Since then, each has created its own bylaws and made constitutional changes (see TABLE 1).

TABLE 1 - South American countries that signed the UN resolution A/ARES/61/106. Current status of education for PWD, laws, and landmarks for inclusion.

Country	Official UN resolution of the CRPD* in 2006	Education laws, programs
Argentina	Signed (March 30, 2007) and formally sanctioned (September 2, 2008)	2016: The government approves the Strategic National Plan for Education - 2016-2021 (Argentina Ensina y Aprende - Plan Estratégico Nacional 2016-2021, Ley de Educación Nacional N° 26.206/06). The plan defines education "as a public good and a personal and social right."[12]
Bolivia	Signed (August 13, 2007) and formally sanctioned (November 16, 2009)	2010: The Ley 'Avelino Siñani y Elizardo Pérez' (ASEP/2010), which emphasized pluri-nationalism and pluri-linguism, provides the bases of education, establishing inclusive education relevant to the needs, expectations, and interests of all inhabitants of the pluri-national state, with equality of opportunities and conditions, without discrimination. Article 25 of the Constitution of the State reads, "…the actions aimed to promote and consolidate inclusive education for people with disability, with learning difficulties, and those with extraordinary talent in a pluri-national educational system…"[13]
Brazil	Signed (March 30, 2007) and formally sanctioned (August 1, 2008)	The law 9,394 of 20/12/1996 (LDB) about guidelines and bases of national education, in 1999 the Federal government published a book titled, "Curricular adaptations of national curricular parameters--strategies for the education of students with special educational needs." 2014-2014 - Ten-year National Education Plan (PNE) to improve all sectors of education and to overcome historic educational setbacks[14].
Chile	Signed (March 30, 2007) and formally sanctioned (July 29, 2008)	In 2006, after a national survey, the government approved the Decennial Plan of Education, which includes inclusive goals[15].
Colombia	Signed (March 30, 2007) and formally sanctioned (May 10, 2011)	2013: Law 1618 emphasized inclusion in the Colombian educational system. The law states that people with some cognitive disabilities have the right to be part of the conventional education system, and, similarly, claimed that quality education takes into account special educational needs[16].

* CRPD, or Convention on the Rights of Persons with Disabilities.

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Ecuador	Signed (March 30, 2007) and formally sanctioned (April 3, 2008)	2006: National Plan of Educational Inclusion of Ecuador 2008: The new Constitution of the Republic stated in 21 articles and a transitory provision that it was the State's responsibility to defend and implement the rights of people with disabilities[17,18].
Guyana	Signed (April 11, 2007) and formally sanctioned (September 10, 2014)	2014: Minister, Dr. Priya Manickchand, introduced the Education Bill to the National Assembly, the first of its kind since Guyana gained independence[19,20].
Paraguay	Signed (March 30, 2007) and formally sanctioned (September 3, 2008)	In 2000, the Minister of Education of Paraguay, with the support of UNESCO, began to implement a model of inclusive education in pedagogy practices[20,21].
Peru	Signed (March 30, 2007) and formally sanctioned (January 30, 2008)	Law 27,337, in the year 2000, contained the Code of Children and Adolescents, with an article about education, culture, sport, and recreation, which said that children and adolescents have the right to education. The State would provide free public education to all Peruvian children and adolescents, regardless of condition such as race, gender, economic condition, disability, etc[22].
Suriname	Signed (March 30, 2007) and formally sanctioned (March 29, 2017)	2018: 90% of disabled children in school attend special segregated schools[23].
Uruguay	Signed (April 3, 2007) and formally sanctioned (February 11, 2009)	2008: Education Act 18,437 established the need for integration/inclusion at all levels of La Administración Nacional de Educación Pública (ANEP). December 2008: Uruguay approved the project to instate a General Law of Education that will ensure and promote quality education for all of its inhabitants, throughout their entire lives[24].
Venezuela	Formally sanctioned (September 24, 2013)	2007: Law for People with Disability. Established the right of PWD to access institutions for education or training. Access to regular school is protected. Also established free and mandatory education for PWD of all ages. According to the Human Rights Watch (2018): "The Venezuelan government withdrew from the American Convention on Human Rights in 2013." Citizens and residents cannot recourse the Inter-American Court of Human Rights for protection against violations of rights[25,26].

This uniform consensus in legislations exist amongst all of the South American countries, according to Mauerberg-deCastro and Campbell[27]. In theory, that is. Reality is another story. It is an undeniable fact that PWD continue to live segregated lives everywhere[b] - before, during and after their school years[28].

Utopia of inclusion?

A main goal of investigating the status of education in the Brazilian school system is to acknowledge its advances, and to contrast them with the enormous gaps that still exist and challenge the process of inclusion. For a teacher in any discipline to be effective, it is paramount that she knows the historical, political, and cultural development of her school or institution. She must be aware that, like broader society, the school, the students, and the teachers and administrators are not static[30]. In fact, all of the components in the educational system (i.e., institutional policies, economic status, curricular structure and content, belief systems and attitudes, individuals and their roles, to name a few) are part of a dynamic, interrelated, multi-levelled system that orchestrates the phenomenon of educating and affects learning. The system (and its components) can improve, but, also, can suffer setbacks in an unpredictable fashion.

For instance, while Brazilian governmental agencies report an increase in inclusive education enrollment as a measure of the evolution of inclusion, the academic achievement of students with disability, criteria for assessing their scholarly performance, dropout rates, and the results of detailed data for PWD who are enrolled in institutions or institutionalized are a mystery. Vague and anecdotal reports appear periodically in experiential reports over the Web, in professional magazines, in the news, and on seemingly unending lists on Internet blogs, etc. Occasionally, international organizations expose extreme conditions of human rights violations concerning PWD. For example, in 2018, the Human Rights Watch[31] reported serious violations of rights of PWD in Brazil after interviewing and visiting people from 19 institutions in three states (São Paulo, Rio de Janeiro, and Bahia). HRW found that children and adults with disability were daily abused (e.g., poor routines for feeding and hygiene, social isolation, bed/room confinement, control of access to earned government income/social security, etc.). According to Mauerberg-deCastro and Campbell[30], the HRW report exposed a small piece of a dark scenario that illuminates how PWD in our country are treated, especially those living in poverty. These Brazilian institutions practice what the United Nations defines as "torture" and "incarceration." These individuals are not even visible to those in governmental agencies who collect statistics and perform inspections, much less to those who should know as to whether they are in school. Government sectors (in charge of inspections and permits/accreditations) appear to be unaware of the extent of violations that these institutions practice, leaving those who live and work in these institutions with a sense of helplessness, according to the HRW report.

Education as a right is an unattainable commodity when poverty and segregation are involved, and Brazil has a high incidence of disability associated with poverty[c],[31]. The possibility for education becomes even more distant for children and youth with serious psychiatric conditions, and for victims of crime, domestic violence, etc[32]. The irony is that they are victims, yet, "outcasts of society" and, consequently of school. In fact, accurate data about PWD and at-risk students, who live in conditions of violence, are nonexistent or fragmented. It is not possible to determine if they attend school or what they do there. On the other hand, the incessant cultures of violence (physical and psychological bullying) embedded in many schools affects teachers and all students, especially PWD. Anecdotal information suggests that many families who feel afraid for the safety of their children with disability prefer to enroll them in segregated special schools.

When the numbers don't add up

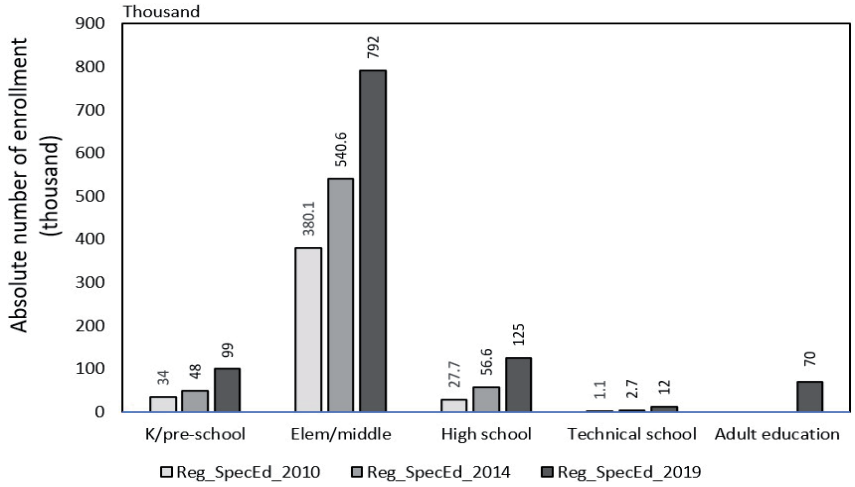
The national census agency, the Brazilian Institute of Geography and Statistics, IBGE (*Instituto Brasileiro de Geografia e Estatística*), reported that approximately ~4.4 million PWD, from a total of ~5.5 million, ages 0-14 years, were in school[d] (i.e., ~88% were in school) in 2010[33]. However, when we excluded the cases referred to as "mild levels of difficulties" (terminology used in the IBGE research) from the sample, the amount of PWD in this age range drops to ~1.6 million, and from this number, ~1,1 million were enrolled in school. The other governmental databank, the National Institute of Studies and Research in Education Anísio Teixeira, the INEP, in charge of assessing education, registers 615,000 students

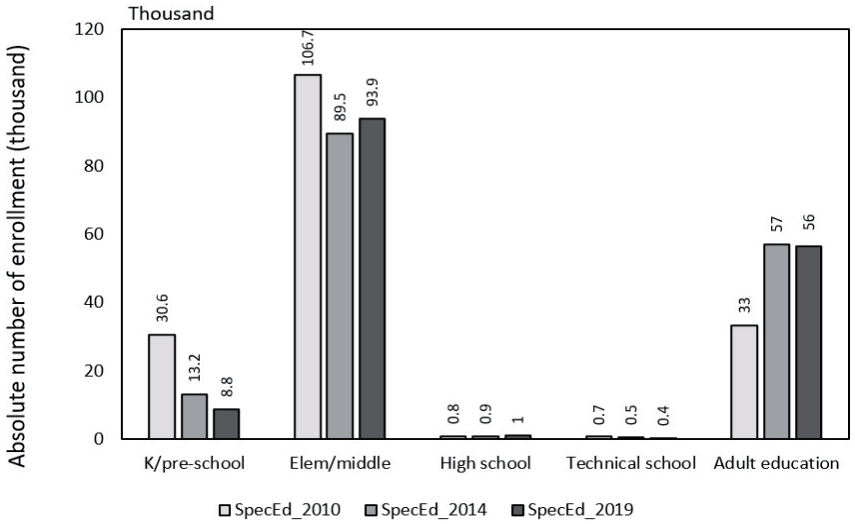
enrolled for special education in 2010 (55.9%). In 2014, numbers increased to 808,000 (74.8%), and in 2019, 1.3 million PWD (89%) were enrolled in the school network system of basic education (both inclusive and special education classes, regardless of age).

The majority of PWDs' school enrollment is in the fundamental grades of elementary and middle school, and in two types of schools facilities: the special school and the regular school with inclusive classes. Typically, cities across the country administer these schools. FIGURES 1A and 1B illustrate, for these two types of schools, respectively, the rate of enrollment in kindergarten/pre-school, elementary/middle school, high school, technical/professional school, and adult education school, for the years 2010, 2014, and 2019[e] . During these years, students with and without disabilities likely would have been enrolled in public municipal schools, which receive 67% of enrollments of all students[34].

FIGURES 1A-1B - Number of student enrollments (in thousands) who are enrolled in regular schools with inclusive settings (A) and special services in special/classrooms (B).

Data from INEP, 2010, 2014 and 2019.



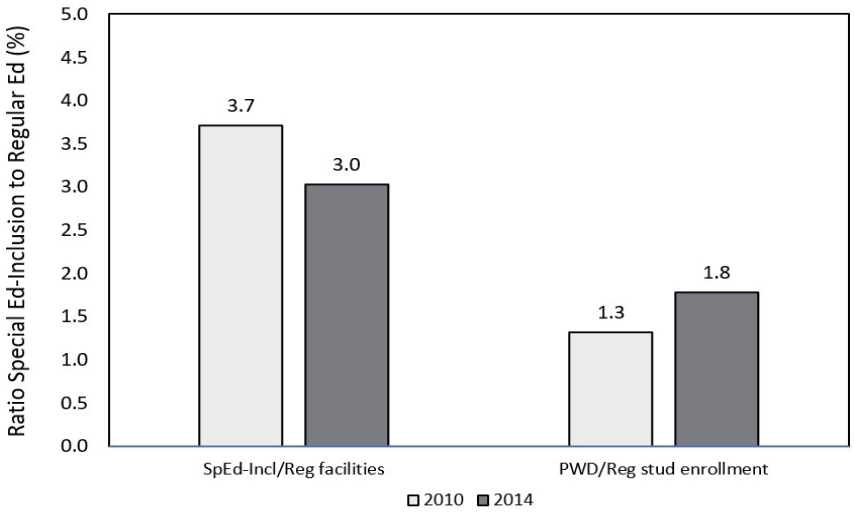


According to the INEP databank on facilities and infrastructures, in 2010[35], only 3.7% of the Brazilian school system network had schools - both with special education and/or inclusive services - in which PWD were enrolled. In 2014[36], the numbers dropped to 3%. In the same period, the enrollment rates of PWD increased in the regular school system network. FIGURE 2 depicts the ratio of facilities for inclusive/special education relative to the facilities for regular schools; and the ratio of enrollments of PWD for inclusive/special education relative to non-disabled students.

INEP reports that nearly 180,000 educational institutions were screened in 2019[34], although no specific number was declared regarding schools that offer special education services. It is possible that, besides different methods of data collection between both agencies, the IBGE and the INEP, data from the former represents PWD who either go to the school network and/or to segregated institutions. Segregated institutions are largely omitted in the education census reports of INEP. In fact, numerous special schools known traditionally throughout the country for providing specialized care (e.g., the Association of Parents and Friends of Exceptional Children, APAE; Pestalozzi Institutes) are not listed in the INEP databank. APAE, for example, has 2,201 affiliated institutions throughout the country, and, alone, serves 250,000 individuals with intellectual disability[37].

According to Mendes[38], the Minister of Education (MEC) revealed that, between 2005 and 2009, over 15,000 facilities received grants for installing resources for special education (i.e., called multifunctional resource rooms – *salas de recursos multifuncionais*) in almost 4,500 Brazilian cities across the country. These grants from the government would be able to supply 82% of the needs for special services through these facilities, according to MEC. The question here is, which of the 190,000 regular schools screened in the 2010 INEP[35] school census were eligible for the inclusion/special education supplement? Although the number of institutions with inclusion/special education services was much smaller (7,200 according to INEP[35], we don't know how these grants impacted the cities' demands for education of their students with disability.

FIGURE 2 - Ratio of available school facilities for special ed/inclusion to school facilities for regular education; ratio of PWD school enrollment to regular students.



Values are represented in percentages. Data from INEP.

In order to maximize resources in education and personnel, municipalities elect specific regular schools to receive students with disabilities, regardless of their residences' location. A problem with resources in existing school network facilities becomes more evident when we analyze their accessibility status, and when we compute existing (or not) resources outside of the classroom such as accessible playgrounds, sport and physical education (PE) facilities, and even adapted bathrooms.

Although higher enrollment occurs in *municipal* schools, their infrastructures are far from adequate. In general, municipal schools are responsible for 2/3 of the population's basic education. While they accommodate most of kindergarten/preschool enrollment and first years of elementary education, only ~16% of municipal schools have a playground for leisure activities, although ~65% report having an open patio for student gathering (undisclosed if they are indoor or outdoor). As for sport practice, ~31% have a sport courtyard (also undisclosed whether indoor or outdoor), and ~48% have sport equipment. For *state* public schools - typically in charge of high school education, ~67% have sport areas, and ~72% have equipment and material for the practice of sport. While regular bathrooms exist in nearly 95% of these schools, bathrooms adapted for PWD are available in only ~37% of the elementary schools of the municipal network, with ~57% of the state schools having adapted bathrooms[34].

As we said before, for the municipal schools, the strategy to accommodate PWD, especially for the kindergarten and elementary school years with the highest enrollment, has been to use a limited number of regular school units to receive these students. For example, Piracicaba, SP, has 19 schools with multiple adapted resources and one for deaf students. The activities are scheduled at different hours (4 weekly hours per student) than their regularly scheduled classes. The city website claims that 298 students are enrolled for special education in 107 school units (138 in kindergarten/pre-school, 160 in fundamental (elementary/middle) education I; and 22 in adult/senior schools[39]. The 2000 census estimated that a population of 4,557 PWD, from ages 0 and 19 years, resided in this city. Therefore, ~6% attended municipal schools[40]. The remaining population must have received education elsewhere (e.g., other State/Federal public, private schools or segregated special education schools), and, likely, some were not in school.

The year 2024 marks the deadline for the expiration of the implementation of the 20 goals that the Minister of Education defined in the last education reform for Brazilian education, the National Plan of Education 2014-2024 (Plano Nacional de Educação - PNE). The latest biennial report by the Minister of Education, published in 2019, was based on the national basic education census[34]. In general, it seems that most of the goals are far from having been fully implemented, according to the INEP report[34]. Significantly, according to the 2017 report from the Federal Court of Finances of Brazil (i.e., Tribunal de Contas da União (TCU), the government has detected specific failures of the PNE due to widespread corruption and financial irregularities, at all levels of public administration[41].

The statistical data from IBGE and INEP present an overview of educational demands in inclusion in regular classes, special education in regular schools, and special education in segregated schools/institutions (inferences made from census data of the general PWD population presented by IBGE). These statistical scenarios in inclusive and in segregated settings can direct us as to how teachers can focus their competencies, since the needs of the inclusive process often are obscure.

The right to full access to education: The case of inclusive PE

The difficulties with, and criticism of, the goals of the National Curriculum Plan (PNE) related to the inclusion process in Brazil largely result from the incorrect perception that students with disability in the regular school system follow an evolutionary path. Such criticism is echoed in other South American countries that, in more recent years, have tried to implement an inclusive process in their schools[30]. Several education scholars have noted that the data that are used to indicate the "success" of the inclusion process are based on enrollment numbers only, which provide a view that is "shallow" at best[30, 38]. Furthermore, even though the 2018 Second-Edition report from specialists at the Minister of Education includes the number of years that PWD spend at each grade level - from kindergarten/pre-school to middle and high school, from the time the PNE was initiated PNE[42] until now, assessments of their academic development continue to provide only obscure information[42].

According to Mendes[38], in her analysis of special education services in regular schools, the government reports do not specify how tests of reading, writing and math skills, for example, were conducted by school administrators and teachers. There is no mention of the criteria, adaptations, and range of expected scores, since policymakers routinely encourage teachers to make flexible curricula for students with disabilities.

As for the PE assessment of students in inclusive or special education settings, there is no mention in government reports (i.e., INEP) of any unified, standardized assessment tool - such as students' scores for reading, writing and math skills, for example. We suspect that curricular implementation and adaptations within the actual PE class are likely made on site, case-by-case, or are improvised. Some studies have found that, after PE teachers undergo training workshops and lectures administered by specialized leaders in the field, or if they have previous experience with inclusion, they express a sense of improved confidence and positive dispositions toward teaching students with disability with diverse backgrounds[43, 44]. However, Haegele et al.[45] suggested that Brazilian physical educators' full support of inclusion relies on their development in specialized training, although they stated that they would accept teaching students with disabilities in their classes. Mauerberg-deCastro et al.[46, 47] found that even experienced teachers who had participated in specialist training in university outreach programs reveal that they need to continue their education in order to work in inclusive settings. Considering that the introduction of the area of adapted PE (APE) (today an umbrella to the area of adapted physical activity, or APA) into the undergraduate curriculum has been relatively recent in comparison with other countries, experiences with inclusion can be quite diverse, even among APE leaders.

In PE school classes, placement of PWD can be more complex than in other disciplines[48-50], since, in a typical PE session, demands on motor skills and physical performance can expose limitations of PWD with issues related to health and physical competence. Studies conducted in Brazil in the contexts of school PE report that students with disability in regular PE classes often are left out and are expected to perform meaningless activities parallel to the main group activities. Some who can participate must adapt to the general group, some are excused altogether, others say they feel exposed or patronized when teachers focus on their disabilities in front of the group. Many with visual impairments are afraid to get hurt, among many other examples[51-54]. Disability conditions such as intellectual, multiple, or autistic spectrum disorder, for example, are perceived as the most difficult for which to implement inclusion[55, 56].

Many Brazilian teachers in the 5,570 cities around the country experience, day-to-day, a reality that includes struggles with didactics in the midst of trying to manage this diversity. They report a common belief that *they are unprepared for the job*. But, this occurs not only in Brazil; this perception is voiced through the opinions and attitudes of teachers from many parts of the world[30, 57-61]. Nations such the United States have long traditions with professional preparation in, and with the development of the field of, APE. However, even in the United States teachers are not fully trained to work with PWD in public schools. Using official educational reports, Zhang[62], found that fully certified APE teachers fill only 24% of the need of the American school system.

Indeed, seemingly countless studies[46, 63-66] that have investigated the potential of physical education in inclusive settings also have disclosed the challenges that teachers face in inclusive settings (some difficulties are extreme; others are minor, some reveal positive and hopeful expectations along with doubts). Other studies have focused on reports from students with disability who were dissatisfied with PE in inclusive classes[52, 53, 65, 67-69]. Infrastructures and resources with accessibility and assistive technology (whether high- or low-tech) are easily identified as unavailable or inappropriate, and, by a large margin, are the most cited barrier to teaching, after need for specific APE training. The human factor plays the decisive role in the implementation of teaching strategies that are based on the goals of a curriculum and its guidelines.

Curriculum and the case of PE

Adding to the challenges above, we believe that our teaching beliefs, which are based on the dominant Brazilian pedagogic paradigm in the field of school PE, the *movement culture*, have failed us (so far) and have not help us transfer theoretical recommendations into effective practice. This might explain, in part, why inclusion has been a slow, discontinuous process.

Scholars committed to developing new pedagogical and philosophical directions in the discipline, "school physical education," established the *movement culture approach* to teaching based on critical sociological theories. This new pedagogical direction was introduced in the 1990s to guide the content of National Curricular Parameters (PCNs), national guidelines and recommendations for the PE curriculum[70]. Today, this critical pedagogy approach defines the PE teaching curriculum nationwide, and it is embraced by many teachers in the school system in all school grades. At the college level, the PE curriculum that was designed to train teachers for the school system has incorporated critical pedagogy as the movement culture approach[71]. Betti et al.[71] analysis of the physical education curriculum of São Paulo states:

> The new SP/PE curriculum has magnified as well as reframed the critical and humanistic concepts of the PCNs; it has expanded the potential for students to embody their movement culture (MC), with a critical-emancipatory approach that makes students the central actors in their body education. (p. 431)

As Schwartzman[72] observed about South American education, this conceptual shift in curriculum development has many influences:

> The education culture in South America is mostly dominated by a mixture of theories about the oppressive nature of the conventional schools, inspired by Bourdieu and Foucault, with the libertarian, constructivist pedagogies inspired in the writings of Paulo Freire and Emilia Ferreiro, combined sometimes with the contributions of Jean Piaget and Lev Vygotsky of the 1920s, but very little beyond that. (Location 485)

The consensus among Brazilian scholars and many international leaders in the field of school PE[6, 73-75] is that the democratic and holistic approach to teaching expands the responsibility of PE teachers towards facilitating students to develop autonomy and critical thinking, using their bodies to express themselves in the culture in which they move. The movement culture came as an alternative to resolve what they perceive to be negative issues (past and present) in the school PE practice. These issues include athletic prowess, oppressive and stress-induced competition, narrow conception of teaching skills, association between health and the dominant media images about body aesthetics, fitness indulgence and compulsive exercise investments, to name a few. New ways of thinking became reflected in a pedagogy responsive to a culturally diverse audience in the PE class. Broadening the delivery of activities and the enhancing strategies centered in cooperation, the Brazilian movement culture approach has the potential to bridge the gap between the excluded, the different, the diverse student. This approach has the potential to expand the impact of, and attendance in, PE classes. The model's precepts foresaw that the students (and teachers) evolve in their critical thinking because they belong to a moving, constructive, driven-to-goals group of individuals. This approach would have the potential to expand impact and adherence to PE classes. The concepts in the movement culture approach foresee that the students (and teachers) evolve in their critical thinking because they belong to a moving, constructive, driven-to-goals group of individuals.

Interestingly, movement culture reflects a context in which the teaching-learning environment is comprised of *complex* (democratic) interactions between students (cooperatively affecting one-another), the teacher (the task deliverer of goals/instructions influenced by a curriculum-driven philosophy), and the learning environment (the school space and resources). *Dynamic systems theory*[f] appears to elegantly describe these open-systems interactions (students, teacher and the school/class environment) in an ecosystem of patterned information (in a constant state of flow and adaptation), as observed by Ovens and Butler[77]. Both approaches (the critical theories approach in movement culture and dynamic system theory approach to education and PE) are holistic ways of interpreting the education phenomenon.

The question, in light of such holistic, humanistic perspectives, is why does inclusive PE have such a long "road to travel"? Why are such theoretical concepts so disconnected from the reality of pedagogical practice in PE? Is it possible that not every teacher understands the scope of the current PE curriculum approach?

Understanding the National Curriculum Standards

The definition of *curriculum competencies* in the National Bases (Standards) of the Common (Core) Curriculum, following the National Curriculum Directives of Basic Education, published for the discipline of physical education in 2013, lists ten specific competencies for the fundamental education (TABLE 2)[14] (p. 223).

TABLE 2 - National Curriculum Directives of Basic Education, published in 2013. The ten specific PE competencies for fundamental education - middle education (6-14 years old).

BNCC in PE: p. 223 - Specific competences in PE (PNEE curriculum guidelines) for the PE area with regard the target competences in Middle Education (6-14 years old) (translated from the original).
1. Understand the origin of body movement culture and its links with the organization of collective and individual life.
2. Plan and employ strategies to solve challenges and increase the possibilities of learning body practices, in addition to being involved in the process of expanding the cultural acquis in this field.
3. To reflect critically on the relations between the execution of body practices and health/disease processes, including in the context of labor/chore activities.
4. To identify the multiplicity of patterns of performance, health, beauty and body aesthetics, critically analyzing the models disseminated in the media and discuss consumerism and prejudiced attitudes.
5. Identify the ways of expressing prejudice, understand their effects and combat discriminatory actions relative to body practices and their participants.
6. To interpret and recreate the values, concept and meanings attributed to different body practices, as well as to the subjects who participate in them.
7. Recognize body practices as constitutive elements of the cultural identity of peoples and groups.
8. To enjoy body practices autonomously to enhance involvement in leisure contexts, expand sociability networks and health promotion.
9. Recognize access to body practices as a citizen's right, proposing and producing alternatives for its realization in the community.
10. Experience, enjoy, appreciate and create different games, dances, gymnastics, sports, martial arts and body practices of adventure, valuing collective work and the protagonist.

Given its subjective nature, each of the propositions stated in the definition of competencies, above, pose a conundrum to the PE teacher responsible for establishing goals in his or her classes for students with disability in an inclusive context. As mentioned, these educational propositions are inspired by social-cultural issues long debated by social and human development theorists. Physical education is centered on the diverse, functional movement skills - expressed individually or collectively - of unique bodies, and on interacting components of the educational social contract (i.e., the classroom under the teacher's leadership). Experiences for everyone (including the teacher) should be effortful, evolving, joyful, and even frustrating at times, because errors are a fundamental component of learning, and, then, of success. In our view of the PNEE propositions, there is an evident gap in sense-making for the PE teacher, who is in charge of implementing the curriculum. The PE teacher constructs each class lesson with age-appropriate objectives, with potentially safe and maximally engaging activities (i.e., no one is left out, anytime), with significant effort requirements (i.e., no sedentary PE), and sometimes must coordinate individually planned activities. Finally, he or she must evaluate the learning outcome (no one is left out). Do teachers really know what realistic, yet educationally valuable curriculum content is? We think the answer, by and large, is "no," and that this conundrum is not just a problem for the PE teacher. It seems to be widespread and

is based in both curriculum design (our words) and ideology. As Mello[78] observed when writing about the Brazilian education system:

> Our curriculum difficulties do not come from a lack of legal support, but from the lack of political leadership and pedagogical competence. (…) Another factor that has hindered the curriculum development is Brazil's chronic inability to put the doctrinal discourse into practice. Managers, teachers and decision makers often rely more on psychological concepts than on didactic pedagogical ones. In other words, it is easier to put yourself into a position of how we learn, rather than to try to say how to teach and what should be learned. (…) Behind such alleged psychological discourse, we find an over-scrupulous resistance to indicate what has to be done in the classroom and consequently the open rejection of any proposal to support pedagogically the curricula, which are seen as offensive to the teachers' autonomy. Such concern in preserving the teachers' decision-making power ends up being harmful to the students' learning process. It is widely known that teacher preparation programmes in Brazil have little quality; offer is higher than demand and, consequently, they attract the students who feel themselves not able to apply for more competitive programmes. Professional autonomy has to be based on pedagogical and didactic skills that the majority of Brazilian teachers have no opportunity to learn in their pre-service preparation. (Location 2875)

There is a common understanding among Brazilian teachers, who

> "(…) are aware that the students in their classes have identities formed within the confines of multi-ethnic and multilingual barriers, poverty, family disarray, years of experience with school failure, exposure to violence and discrimination, and disability conditions perceived as restrictive. They know, too, that many of their students likely will grow up, transitioning into adulthood unprepared, and with little knowledge about, and little competence for, problem solving."[30] (p. 162)

One purpose of our evolution as mentors to future generations, our students, is the exploration of new directions. Yet, we also must guard our legacy of academic progress. Dismantling all past practice styles from the past so dismissively increases the risk of repeating old, inadequate practices (see the case of rebranding "hygienism" in today's "fitness culture" of the health movement, as analyzed by Góes Junior and Lovisolo[79].

The health crisis in our modern, sedentary society and shortcomings with practices in inclusive PE: Can these problems be overcome with a pedagogical solution?

Recently, a popular theory in behavioral sciences that is novel to applications in education, and even less familiar in PE and in inclusive PE practices, has shown promise: *dynamic systems theory*[76].

The future holds, it seems, a hybridization of concepts and models to serve diverse audiences in inclusive PE settings. Critical theories concepts[80-82] and dynamic systems concepts[76-77,83] in the field of physical education pedagogy help to create a focus on pedagogical practice that reflects *cooperative learning*[84]. The challenge is to make the works of scholars in these two epistemological traditions, which typically include sophisticated enunciations of the paradigms, pragmatic and accessible communication tools for the schoolteacher, so that adherence to their respective theoretical ideas is motivated by knowledge instead of by popular educational fads. With regard to professional standards (see critiques[78]), Brazilian teachers' pre-service training is indeed chaotic, disjointed, improvised, and informal. Therefore, it is conceivable that the confusion and mistrust entrenched within the school system and amongst teachers result when curricular recommendations and pedagogical practices are molded solely from revolutionary, institutionally safeguarded doctrines. PE is no exception. To complicate matters even further, physical education as a scientific field has been reformed as a *human movement science*, with a strong body of knowledge in motor behavior, neuroscience, and exercise sciences, while the scholarly activity in PE pedagogy focuses on *socio-anthropological* theories. As such, the influences of humanism, constructivism, behaviorism, as well as positivism have strongly informed the practice for physical educators.

Physical education practice in inclusive settings becomes even more complicated when students with disability remind us of the social and political implications of the damages

associated with professionals' compliance to the *medical model* of disability, and to their resulting exposure to social problems such as (chronic) exclusion and victimization.

To make matters worse, the field of school PE has been confronted with administrators' outsourcing of "curriculum" services, which has brought the business *fitness* model into the equation[73]. Together, these divergent epistemologies have contributed to issues of obesity, sedentarism, oppressive ideals of perfection in the media, and business-oriented or market-oriented curricula centered on academic performance. All in all, these differing approaches, layered on top of and within the government's official mandate for a critical-emancipatory curriculum, makes the confusion run deeper for teachers and students alike.

How did leaders in APE become involved with school PE?

In Brazil, since the discipline of APE was formally introduced into higher education PE programs in 1987[5, 85], countless students and teachers have had experiences with innovative, creative and successful intervention experiences with PWD, particularly in outreach programs for the in-service and pre-service training of teachers, sport coaches and therapists in universities all over the country. TABLE 3 registers some of the important outreach programs that were installed in PE programs in higher education institutions and were included in PE services, teacher pre-service and in-service training. Some of these programs included inclusive strategies as well. The first initiatives started in the early 1980s, before the formal introduction of APE as a curricular discipline in PE undergraduate courses in 1987[86], and many currently are still active.

These efforts, in significant ways, have contributed to the knowledge construction embedded in the school PE discipline, albeit mostly in textbooks and other APE literature in APE[5, 87-89]. The problem that persists is an absence of cohesion amongst the multitude of informational sources available for rehabilitation, developmental interventions, Paralympic sports development, and other, sometimes unique ways of delivering PE activities. Unfortunately, some of these experiential outreach programs have been eliminated from the school curriculum, and their termination has left only archived historical references. Even widely successful, innovative ideas for inclusion have had short lives, including the T*ransforms Project (Projeto Transforma)*[90], which was fully sponsored by the mega-event Organizing Committee of the Olympics and Paralympic Games in Rio.

Our own experience is that the closing of pioneer APE outreach programs at our university (the State University of São Paulo), which started in 1987 and ended in 2018, has left a gap in the community, leaving absent an important provider of services. Numerous studies resulted from these experiences (as with other colleagues around Brazil), and findings from these experiential studies have been published in international peer-reviewed journals. Attendance in our teacher-training programs has produced some extraordinarily talented teachers, researchers, and administrators, who are now staff members of schools and universities in our local area, in other regions, and even abroad. Some have, themselves, become leaders in the field of APE at the college level.

Occasional governmental initiatives include teacher training in inclusive PE for a larger audience of teachers, and with broader geographic reach. For instance, in 2008 (and again in 2009), sponsored by the São Paulo State Secretary of Education, an intensive 5-day, full-time workshop was administered to a team of 90 special education teachers and 90 PE teachers, leaders in the 90 São Paulo school districts. General content in APE and samples of effective pedagogical practices were presented and discussed. These leaders then disseminated the workshop information with PE teachers to be formatted and adapted for their local schools in their local districts. Similar initiatives multiplied everywhere in the country in short-term training events, often in co-participation with universities. Yet, results from these continuing education training experiences are inconsistent. PE teachers continue to say that they feel unsure about how to teach in inclusive settings. One uniform consensus, however, is that research shows that PE teachers have a positive attitude about working in inclusive settings and are open to participating in continuing education/training programs[44.46,64,66].

TABLE 3 - Sample of outreach programs in PE programs in higher education institutions included in PE services, teacher pre-service and in-service training.

University or college	APA Activity	Leader
1. University of São Paulo, USP; School of Physical Education and Sport (EEFEUSP) 2. EEFEUSP - AACD 3 - 4. EEFUSP 5. EEFEUSP	1. Swimming practices for intellectual disability (community service). (1980-1984) 2. In 1989, Project in partnership EEFUSP-AACD (Association for Assistance to Disabled Children: implementing PE classes in the school sector of the AACD Ibirapuera unit (2989-1991). 3. Child Project - Community care for children ages 4-18 years, including PWD, developed at the sport center of USP, linked to the discipline of teaching practice). (1985-1992) 4. Swimming course - included a restructured teaching strategy for competition in swimming using playful and knowledge construction activities. (1993) 5. Swimming for People with Disability/Inclusive swimming (target groups: people with motor and sensory impairments) (1995-current)	1-4 Verena Junghahnel Pedrinelli (1980-1993) 5. Élisabeth de Mattos (1995-2017); Rômulo Bertuzzi; Otávio L. P. C. Furtado (2018-current)
Federal University of Minas Gerais at Belo Horizonte	Sport Center for People with Disability - CEPODE	Pedro Americo de Souza Sobrinho
Federal University of Uberlândia	1. Macro cycle of physical training applied to the disabled: rehabilitation and social integration (1984) 2. Disability Care Program, PAPD (1984-current)	Alberto Martins da Costa and Patricia Silvestre de Freitas (1993-2018) Solange Rodovalho Lima (2018-current)
1. State University of São Paulo, UNESP at Rio Claro; Association of Parents and Friends of Exceptional Children, APAE; Association of People with Disability of Rio Claro, ADERC 2. UNESP; Londrina Institute of Education of the deaf, ILES 3. UNESP; Institute Alan Kardec 4. UNESP; APAE 5. UNESP; Bezerra de Menezes Psychiatric Hospital 6-9. UNESP 10. UNESP; APAE; Koelle School 11. UNESP; Nursing home São Vicente de Paula 12, 14. UNESP; APAE; Koelle School; Adventist School 13, 15. UNESP; APAE	1. Adapted PE Program (Proefa) (1988-2018) 2. Dance for the Deaf (1987) 3. Dance and theatrical expression for orphan girls at risk (1989) 4. Adapted PE for children with intellectual disability (1990-1991) 5. Leisure, body expression, and creative dance for psychiatric patients with chronic psychosis (1989-1990) 6. Dance and auditory perception training using dance for deaf children (1990-1991) 7. Aquatics for deaf children (1993-1994) 8. Trampoline for deaf children (1997) 9. Independent navigation and spatial orientation for blind adults (1997) 10. Adapted PE Program (Proefa) for children with intellectual disability assisted by non-disabled children of Elementary Schools (2000) 11. Recreation for older institutionalized adults assisted by children in first grade schools attending remedial classes (2000) 12. Inclusive Adapted PE Program (Proefa) (2003-2011) 13. Adapted PE Program (Proefa) using sport activities (2013-2014) 14. Adapted PE Program (Proefa) assisted by canine peers (2003-2011) 15. Adapted PE Program (Proefa), using an “Anchor System” for postural rehabilitation (2012-2013)	1-6. Eliane Mauerberg-deCastro 7. Carmem Silvia de Oliveira & Eliane Mauerberg-deCastro 8. Cicero Campos & Eliane Mauerberg-deCastro 9. Adriana Inês de Paula & Eliane Mauerberg-deCastro 10-15. Eliane Mauerberg-deCastro

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1. University of Marília, UNIMAR 2. Institute SORRI, Bauru	1. Wheelchair Basketball Project (1989-1996) 2. Project of Adapted Motor Activity (1996-2006)	Manoel Seabra Junior
1. State University of São Paulo, UNESP at Presidente Prudente, Municipal Secretary of Education 2. UNESP	1. Project Rhythm and Dance for Down Syndrome (2011-2014) 2. Project Badminton for Down Syndrome (2012-2015) 3. Project for Students with Hyperactive and Attention Deficit Disorder (2012-2015) 4. Adapting Resources for Assistive Technology. Target groups: cerebral palsy, multiple disabilities, and spina bifida (2010-current) 5. Adapted Virtual Games (2013-current) 6. Adapting table/board games (2014-current)	Manoel Osmar Seabra Junior
State University of São Paulo, UNESP at Bauru	1. APE for intellectual disability, and visual impairments (1993-2018) 2. Project Learning with the disabled body 3. Goalball (2012-2019) 4. Equine-assisted therapy (2008-2019)	Marli Nabeiro
Faculty of Physical Education of the State University of Campinas, UNICAMP	1. Physical activities for the blind and visual impaired (1987-current) 2. Sports initiation for the blind and visual impaired (children, adolescents, adults) (1987- current) 3. Paralympic Sport Training 4. Adapted Fencing 5. Physical Education and Sport for Spatial Orientation and Mobility for Children with visual impairment 6. Dance for children with visual impairment 7. APA for people with visual impairments physical disability and cerebral palsy (2018 - current) 8. Winter sports for people with physical disability and visual impairments (2020 - current)	1-6. Edison Duarte José Julio Gavião de Almeida, José Irineu Gorla 7-8. Maria Luíza Tanure Alves
Federal University of Paraná	Adapted Motor Activity for People with Disability. Target groups: for intellectual and physical disability, and visual impairments of all ages (1994-2017)	Ruth Souza Cidade
1. Federal University of Paraíba, João Pessoa (UFPB) 2-3. UFPB/Minister of Sport of Brazil	1. Adapted Sport Program: in search of autonomy of movement for people with physical disability (2011). 2. Sport Nucleus of High Performance. Target group: people with physical disability (2012-2013) 3. Paralympic Sport in School (target group: students with and without disabilities) (2014) Sports and Physical Training (target group: people with spinal cord injuries) (2019- current)	Elaine Cappellazzo Souto
Federal University of Alagoas	Group of Outreach Program in Adapted Motor Activity, GEEAMA (1994; 2003-current)	Neiza F. Fumes
Federal University of Santa Catarina	Adapted Motor Activity Program, AMA (1995-2018)	Angela Teresinha Zuchetto
1. Lutheran University of Brazil, ULBRA, Canoas (RS) 2. College SOGIPA at Porto Alegre	1. Center of Adapted Motor Activity (CEAMA). Activities: indoor soccer, dance, swimming, functional training (1997-current) 2. Early Stimulation Recreation Services (SEER) (2014-current)	Rosilene Moraes Diehl

Continued

Continued

Federal University of Amazonas, Physical Education and Physical Therapy School	Adapted Motor Activity Program, PROAMDE (2000-current)	Kathya A. Thomé Lopes
Dom Bosco Catholic University, UCDB, at Campo Grande (MS)	Project New Life. Target groups: motor and intellectual disabilities, visual impairments, autism (2002-2004)	Joslei Viana de Souza
Federal University of Santa Cruz at Ilhéus, BA	1. Outreach Program in APA (2013 - 2018) 2. Paralympic Sport for the municipal Schools of Ilhéus and Itabuna (2008 - current) 3. Athletes of the future: Body in motion (2019 - current) 4. Gymnastics for all: Integrative and interactive actions (2011 - 2013)	Joslei Viana de Souza
Federal University of São Carlos, UFSCar	Project Physical Activities, Sport and Leisure Adapted for People with Disabilities, PROAFA. Target groups of all ages: sensory disabilities, intellectual, physical, multiple disabilities, and autism (2006-current)	Mey de Abreu van Munster
State University of Londrina, UEL	1. Sport for Health and Quality of Life. Target groups: people with spinal cord injury (2007-2014) 2. Project Swimming for all. Target groups of all ages: sensory disabilities, intellectual, motor, multiple disabilities, and autism (2007-current)	1. Rosângela Busto 2. Márcia Greguol Gorgatti
University Center of Adamantina, UNIFAI	1. Project Physical Activity of Psychiatric Patients (2008-current) 2. Project Physical Activities APAE (2008-current) 3. Project Adapted Weight lifting. Target groups: chronically ill patients and people with physical disability (2008-current) 4. Initiation in Adapted Sports (2008-current)	Gabriela Toloi
Federal University of Ceará	1. Women Wheelchair sports (2011-2015) 2. Adapted Swimming (2011-2015) 3. Adapted Athletics (2011-2015) 4. "Pro-Movendo" Smiles. Target groups: people with autism and Asperger (2011-2015) 5. Inclusive Judo (2011-current)	Adriana Inês de Paula
Federal University of Vale do São Francisco, UNIVASF at Petrolina	Paracanoeing: Rehabilitation and Inclusion of People with Disability in the São Francisco Valley region (2017-current)	Leonardo Gasques Trevisan Costa
University of São Paulo, USP at Ribeirão Preto	Goalball: inclusion Through Sport (2018-2019) Paralympic Sports: Soccer 5-a-side (2017-2018), Goalball (2017-2018), Boccia (2016-2017), sitting volleyball (2017-current)	Marcio Pereira Morato

Complexities of "paving the road" to inclusion in school PE

In this sub-section, we address the complexities of inclusion in school PE by describing our practical experiences during a lifetime of work in the field of APE at São Paulo State University. For the past 30 years, I (Eliane Mauerberg-deCastro) supervised the organization of various forms of PE for people with disability, of all ages. My first experience was during the execution of my masters' thesis. It concerned the introduction of perceptual-motor activities through dance and expression to deaf children at the Londrina Institute of Education for the Deaf (ILES). I had been inspired by my previous experience, in 1985, with the ILES group and their dance program[91]. I expanded the intervention strategies to include exercises that ranged from simple listening/touching vibration of various sounds, chanting or vocalizing perceived sounds, to moving their bodies collectively to structured sound with continuous contrasts (i.e., slices of various music pieces recorded in sequence). These deaf children moved their bodies and danced, adjusting their pace to the sounds of music (e.g., shaking, trembling, smooth or rigid movements, wide or limited motions, etc.). The instructions (e.g., written, drawn, verbal, signaled, and combinations) were meant to inspire mental images to dramatize/express ideas through dance or play. Also, imitation of traditional dance exercises and choreographies were part of the children's training. After a semester-long intervention of weekly sessions of three hours, I demonstrated that deliberate training in auditory perception within a dance program can improve auditory discrimination of acoustic frequencies, discrimination of temporal duration of acoustic tones, and reproduction of rhythmic acoustic structures[92].

Throughout the three decades of APA outreach programs at UNESP (see TABLE 3), we (myself with the help of hundreds of undergraduate and graduate students) developed a series of ideas using PE and sport themes (e.g., dance, swimming, developmental activities, postural control intervention protocols, exercise, adapted sports, etc.) for children, adolescents, young and older adults with various disability conditions (i.e., intellectual disability, deafness, visual impairment, cerebral palsy, physical disability with wheelchair dependency, autism, multiple developmental disabilities, psychiatric conditions, etc.).The acronym for all of these adapted PE programs is *Proefa*, which means *Adapted Physical Education Program (Programa de Educação Física Adaptada)*. Most cases of developmental/intellectual disabilities were mild and moderate in severity, but we always had individuals with severe disability who received individualized PE in the same area in which the other participants performed their activities. The autistic children, who are noise intolerant, often were moved to opposite sides of the gymnasium from where the group activities took place.

In several events, Proefa participants interacted with non-disabled peers: classes in which Proefa participants delivered activities to their parents in 1989; Proefa participation in a dance festival in 1990; Proefa participation in the annual one-day APA festival. The APA festival, held each year from 1998 to 2018, was organized and delivered by undergraduate students who were enrolled in our APE classes. Each year, organizers invited participation from our entire university community, the special education institutions in Rio Claro and the region, as well as from several regular schools. In 2004, 2005, and 2006, Proefa students and their peer tutors from regular schools participated in special animal-assisted therapy activities held during the AFA festival events, and, occasionally, in other workshops at local and national APA conferences (see FIGURE 3).

The year 1999 marked the beginning of our first long-term experience with peer tutoring. The tutor program started with students from an elementary school (i.e., fundamental education), 10-11 years old, who volunteered to participate in Proefa. In 2000, we designed a unique peer tutor experience with older people, residents of a nursing home. We invited children, ages 9 to 13, who were in remedial school classes, to take part in the project. Throughout the year, these kids were instrumental in interacting - through proposed activities - with frail, sedentary, isolated, often depressed older adults. The team of teachers was comprised of five graduate and one undergraduate students, and 10 volunteer children (FIGURE 4).

FIGURE 3 - Scene from an animal-assisted adapted PE workshop at UNESP in 2004.

FIGURE 4 - Peer tutoring in a residential home for older people (From Mauerberg-deCastro, 2011; with permission).

The experience with peer tutoring lasted until 2011. In 2008, our tutor model was inspired by concepts from Klavina and Block[93]. The model, nicknamed "IFS," summarizes what tutors should do with their peers with regard to "instruction support (I)," "physical support (F)," and "social support (S)." *Support in instruction* means offering help/guidance for learning. The tutor uses verbal explanation and demonstrates the activity as they (tutor and tutee) move together throughout the execution; they incentivize their peer by encouraging her to keep trying; they give feedback, correcting or complimenting achievement. *Physical support* means to engage with maneuvers and contact with the peer's body; they induce movement, and physically engage in the execution (pull or accompany the peer; engage in cooperative games). *Social support* implies many friendly interactions: engaging in visual contact with one another, knowing and using each other's name, talking about trivialities and making comments about the class, listening and paying attention, encouraging, laughing, shouting, even cheering.

For training of the teachers and assistants, the emphasis involved several issues: the demands with volume/intensity of activities (specified in their lesson plans: allocating time, repetitions, and control of heart rate by counting pulse and/or visual signs); designing motor/physical activities (complexity, repetitions,

effort demand, competition with emphasis on engaging and not on winning/losing); and expressive activities (creativity, spontaneity, cooperative engagement). The teaching team also has to consider activity content (not theoretical, although they can talk about concepts as they execute tasks) that emphasizes sensory-motor functions (e.g., postural control in mobility and balance tasks, as well as strategies for managing atypical primitive reflexes and explaining the phenomena - common in cerebral palsy), perceptual-motor learning (e.g., focal-divided-sustained-alternated attention, short- and long-term memory, eye-hand-foot coordination during object control games, rhythm, reaction and response time, spatial orientation skills for navigation, awareness of spatial layout, objects' attributes, directions, time, etc.). Activities related to *cognitive functions*, also, were required to be deliberately programmed, such as concepts linked to words and objects (e.g., color, dimensions, parts and whole), concepts of number (e.g., sequence, magnitude and scales, arithmetic operations, geometric arrays, etc.), concepts of events (e.g., speed, inertia, acceleration, center of mass, momentum, flight paths, centrifugal force, contraction, extension, plane of motion), concepts of constituent elements of the body (e.g., limbs, torso, head, muscles-bones and their names, organs, etc.). These concepts were explored based on the cognitive development level of the students, especially the tutors. We believe that the participants should speak about these concepts at the time an activity or task is being performed. The pre-service teachers and assistants (as well as peer tutors) must speak simply and directly, even if a student appears not to understand. The student might be making the associations.

Our Proefa teachers/instructors (many physical therapists have directly participated in our programs over the years) are supposed to emphasize self-competencies and positive attitudes in order to ensure self-actualization of the group and teachers/instructors. We argued that the rate of success in class should be high, but, also, sometimes the content should be difficult enough to create failures, so we could observe students' reactions to frustration, and, also, control boredom from tasks that are too easy. For example, when participants (including tutors) with varying skills perform a simple balance task, the introduction of new constraints such as a blindfold, an object to carry, or holding onto another kid, etc. can lead to his full participation, and the task demands are then individualized on site.

Issues of discipline were a constant problem for college students in pre-service training. Controlling hyperactivity, defiance, aggressivity, victimization, running away, and harassment, to name a few problems, was a "nightmare" for these future teachers. We have clear rules and a strict routine for participants, and everyone was informed about these on the first day of each program's semester and reminded in each class. First, routines for arrival and leaving classes were the same for every day, and everyone had to comply. Due to safety issues in the gymnasium, we decided that participants were to leave their belongings in one specific location and form a line to walk to the teaching area. Only one teacher at a time lead the administration of each class, and the rest of the pre-service staff worked as assistants (everyone had to teach a class during the semester). Disciplinary problems were addressed by someone previously trained by the coordinator, and when serious issues occurred, the offender was removed, but never to a place outside of the class (we believe watching peers having fun can provide an opportunity to negotiate better behavior). We also clarified to all participants that they have the freedom to ask to leave class; however, they had to stay at a specific bench in the gymnasium (we called it "the thinking bench"), within sight of the class. An assistant was present to provide company and conversation. All members of the staff had a clear understanding that they never should tell a lie or make promises or threats (ever) to the class. The principle teacher maintained his authority through simple actions such as always addressing the class from a central, clear position of the class area, and used a whistle to get the group's attention for various reasons, but never unnecessarily. The tutors were advised never to yell, but, instead, to speak loudly, clearly, and simply. Kids with autism or developmental spectrum disorder were touched firmly to ensure balance and assertive guidance. Touching was brief, and tutors' verbal rhythmic rehearsing (counting or singing) during repetitive/continuous movements helped to prevent these kids from abandoning their tasks.

Teacher and assistants were required to

participate in the activity occasionally to demonstrate patterns of movements/techniques, or simply to engage with the group. Assistants and tutors could support, induce, nudge, hold for security measures, and coordinate their actions with their peers (see FIGURE 5).

In some specific classes we reversed the roles of tutor and tutee. The non-disabled participants would wear a blindfold or sit in a wheelchair, while a child with a disability (including severe ones) would be the helper. In this case, the assistants closely monitored their actions and talk throughout, verbally recalling the IFS concepts accordingly. This strategy helped the others to develop awareness and a sense of responsibility. For the tutee, receiving instructional support from a peer with a disability helped to expand their respect, trust, and understanding of having to rely on others. In order to ensure a rapport between the tutors and encourage them to mutually share their experiences in the Proefa program, we introduced an additional 20-minute session, just before class started. These meetings were intended to promote the tutors' feedback about their participation and to stimulate their interest and commitment. During some semesters, we shared still cameras with the tutors so that they and their peers could photograph one another during the Proefa sessions.

Around 2008, it became apparent that new pre-service PE teachers were gradually beginning to insert sedentary activities into their classes. These pre-service teachers performed elaborate, long explanations of tasks, which kept the students still or waiting (many tended to engage in parallel activities). They also made constant interruptions for corrections, inappropriately used single repetition routines for discrete types of movements (e.g., throwing, receiving a ball), chose tasks with low-intensity exertion demands, and left students to do nothing while waiting in line for their turn. Some teachers told long stories during games to engage students' mental imagery, but these had little educational value and, often, the students' attention wandered off. From these identified problems, we redefined the requirements for lesson plans and class delivery using two principles: maximum participation opportunity for everyone and *non-sedentary activities.*

The first required teacher and assistants to ensure that no student or tutor would be left waiting his or her turn to execute a task. Everyone would have to be assigned with simultaneous opportunities, even if a set of tasks required rotation in order. Faster and more skilled kids would pass in front of a slower one. The lesson plan for the class activities and its actual execution would include this principle.

The second principle was a bit more difficult to achieve. It required us to circumvent these college students who had learned to misrepresent the ideas of the movement culture approach. For example, during game construction with the group, some pre-service teachers transferred choices to disabled students (or tutors) to "ensure democratic participation." The result was unfortunate. Often, one or two of the disabled students (or tutor) would want to show off, and would dominate the group. Most of the others did nothing, as they had no idea (or previous experience) about what to create. Some were too shy. When the pre-service teachers asked for suggestions about appropriate movements, no one volunteered. When a disabled student was chosen to participate, he simply

FIGURE 5 - Peer tutors helping a child with severe intellectual disability perform a motor task.

would repeat the movement that had previously been demonstrated and would maintain the pattern until asked to stop. The next participant would then resume the movement of her previous peer. And so on. Their "strategy" reinforced this perseverative phenomenon, which had no purpose. The result was that these college students in training were confused and disappointed with themselves. But, instead of learning from their mistakes, they preferred to avoid or deny the incidents. We/I (the program's coordinator) learned that the solution was to individually proof each lesson plan and meet with the pre-service teacher in charge to discuss classroom options. We also established rules for distributing volume of activity and intensity throughout each session, which includes guidelines for demonstrations and verbal instructions. We began to measure blood pressure and heart rate of the participants with disability before the start of each class.

Our various protocols for pre- and post-participation assessments of fitness levels and health could now be analyzed to determine whether or not they could make a significant impact in only two one-hour sessions per week (the current requirement for the PE class is one 50-mintute class, twice a week; many schools use one of the classes for theoretical content only). In 2010 and 2011, the collected data about physical and health conditions of adolescents and adults with intellectual disability were part of a research study about the impact of limited-time PE, and whether the pedagogical strategies that employ the two principles, above, actually compensate for these relatively brief encounters. The results showed little impact on skills that require coordination (e.g., throwing as far as possible, jumping, shuttle-run test). We found no effect on flexibility or nutrition parameters (i.e., body mass and skinfolds remained unaltered). However, for the health parameters for heart frequency, blood pressure, and the results of the cardiovascular tests (5-min bench test), we found significant, positive changes. Many of the participants were hypertense before their participation in the program, but they reached normal values by the end of each semester. The cardiovascular parameters always declined for groups from both years during the month-long vacations between semesters[47].

A challenge in maintaining significant physical exertion demands was presented in the years 2012 and 2013, when, for the purpose of a study on postural rehabilitation, we implemented an exclusive protocol of balance tasks in the Proefa classes. The research idea was inspired during regular activities of Proefa in the year 2000, when some students who had significant balance problems would perform dynamic balance tasks only when they were able to touch someone (usually their tutor), even if they were just holding onto the tutor's clothes.

We designed a laboratory-controlled task to assess the extent of the benefits of this kind of mediation between an individual and a soft, subtle, dynamically connected object (i.e., a person, a garment, a piece of cord). We called it the "anchor system"[94] (see FIGURE 6 as an example). Since that time, the benefits have been confirmed in many other lab-controlled studies by colleagues around the world[95-97]. A preliminary report of the Proefa training protocol using the anchor system, which included pre- and post-tests of experimental and control groups, was published in 2014[98]. The anchor training protocol had the potential to recreate the problems of sedentary PE. Therefore, we adjusted the demands on isometric exercises and muscle overload using prolonged static body positions to ensure physical exertion. Also, we introduced dynamic balance tasks on unstable support surfaces. Indeed, we were able to implement meaningful physical activities using the anchor tasks for both the experimental and control groups. However, the control group, which did not use the anchor system during the balance training protocol, failed to improve their performance in the lab-controlled postural tasks, as predicted.

The implementation of PE in inclusive settings with peer tutors (such as our Proefa program), or in segregated settings, requires complex and continuous planning and follow-ups. Moreover, for the PE teacher in the work force, who, alone, oversees people with various ability levels and disability conditions and their non-disabled peers, the task is brutal, with complex demands in time, expertise, and control of variables (most are unpredictable). Our 30 years of existence with the Proefa program has reinforced this realization. To successfully implement inclusion in school PE, the team involved requires school administrators, an expert APE consultant, teachers from other disciplines (e.g., math, sciences, arts, etc.), parents, and, when pertinent, the participation of all students, including PWD. Also, extra-curricular activities may include guest lectures by people with disability in the community, athletes with disability, past students, etc.

Our final recommendation is that PE should be a critical part of childhood early intervention programs: as a significant influence on healthy lifestyles, it cannot be outsourced. In addition to

the rehabilitative benefits of exercise and sport for PWD and those without disabilities of all ages, there are innumerable social benefits to simply interacting with others. Most importantly, when we move, we learn; when we move meaningfully and vigorously, then we become part of the mission, "PE for all" (FIGURE 7). We, physical education teachers, need to embrace the mission of designing physical activities that provide joy to all of our students. Activities with similar objectives can be designed for a heterogeneous group without having to be "dumbed down" because some kids have difficulties. Strategies for various task requirements and complexities can be implemented simultaneously to meet the abilities of all students. If we simplify task demands, we run the risk of making PE boring and creating an aversion to all physical activities, including sports (and competition). If we do not teach students to use their motor skills successfully, we run the risk of making PE a luxury, and a precedent for exclusion. In higher education, we have already noticed that the newer generation of PE undergraduate students have significant limitations in motor skills, particularly in sports.

FIGURE 6 - Illustrating an APE class using the *anchor system* in dynamic balance tasks.

FIGURE 7 - Applying the principles of "maximum participation" and "non-sedentary activities."

Final remarks

The introduction of new models into pedagogical methods does not ensure quality of actions, in the same way that legislation and policies about educational rights do not assure their implementation[8].

Inclusion comes not just with enrollment numbers, but through a more complex scenario that includes widespread opportunities for teacher preparation and continuing education, interdisciplinary and multidisciplinary support systems, obligatory fair and thorough assessment and placement policies, prioritized budgeting for infrastructure and individual assistive technology support, science-based and efficient practice models for curricular development, realistic goals, and accountability at all levels of the school/education system. We hope that the future will bring these to the Brazilian community of PWD, their families, and associates.

The movement culture philosophy in PE, the leading paradigm of our national curricula plan and directive, has seeded the conception of PE practice across the nation. Yet, a cohesive plan for implementation of inclusion is nonexistent. Teachers feel unprepared, although they say they are motivated to learn about and embrace inclusion. The intellectual understanding and adherence to the complicated core theories that inform our nationalized pedagogy requires time for studying, commitment, opportunity, and governmental investments in continuing education training (recurring opportunities) for teachers. Short-term, occasional opportunities for teacher training is not enough[45], the same way in which the practice of PE in school that is limited to two, weekly, 50-min encounters (one that is theoretical) is not enough for students to receive general health benefits, or even to leave the status of sedentarism[47, 99].

Our experience with teaching APE and with strategies of inclusion (e.g., peer tutors) have shown us how closely our practice resonates with concepts of *dynamic systems theory*. Over our last 30 years of experiences, we have discovered that this concepts help to provide a holistic approach to education, which can be utilized in the inclusion process (including rehabilitation) of individuals with disability of various ages, types, and severity levels of disability. Whether epistemological directions include the movement culture approach or dynamic systems theory, or a hybrid, these efforts must be sustained by committed teachers, the school system, government leaders, families, and the entire community.

Notes

a. The World Health Organization recommends that the identification of disability status should include a biopsychosocial approach and offers an international classification system, the ICF based on functionality, disability, and health status[10].

b. "According to the Harkin Institute, a billion people worldwide are affected by disabilities and face an unemployment rate of 80%."[29].

c. "When poverty status is measured using the PPP US$1.25 a day international poverty line, the prevalence of disability is significantly higher among the poor than the nonpoor in four countries: Malawi, Zambia, the Philippines, and Brazil," according to the World Bank[31].

d. The total population of PWD sampled in 2010 was 45.6 million people (23.9%). We included population data for PWD identified as having "significant disabilities" (we excluded "mild levels of difficulties" - terminology used in the IBGE research).

e. We chose the year 2010 because it was the last year when IBGE published a census report on PWD. The year 2014 was the last year that data from the education census was available in the INEP databank; and for the year 2019, the education census was available only in the INEP summary report.

f. According to Mauerberg-deCastro[76] dynamic systems theory is centered on how the presence of information affects a system's organization (e.g., behavior) through specific patterns. The dynamic term used in this context refers to patterns of spatial, temporal and functional organization. In studies of human movement, it includes the application of formal and analytical tools of nonlinear dynamics to the coordination of movement. The theory deals with the spontaneous formation of patterns or structures in systems via self-organization. "How do the parts relate to the whole?" (p. 2)

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