Physical Activity Programs in Higher Education:

MODIFYING NET/WALL GAMES TO INCLUDE INDIVIDUALS WITH DISABILITIES

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The number of students with disabilities in higher education settings has been growing over the past 10 years (Katsiyannis, Zhang, Landmark, & Reber, 2009; Madaus, 2011). Consequently, colleges and universities now face the challenge of providing services that enable inclusion for an increasingly diverse body of students. According to the Americans with Disabilities Act of 2008 (ADA, 2008) individuals who have a disability and who qualify for programs cannot be discriminated against and must receive appropriate services in order to meet academic standards (Barfield, Bennett, Folio, & Killman, 2007). Although great progress has been made in terms of providing college students with disabilities with accommodations in the academic realm (Higbee, Katz, & Schultz, 2010), little has been done to establish appropriate support, services, and accommodations for students with disabilities in physical activity (PA) courses in higher education (Rizzo, Broadhead, & Kowalski, 1997).

Inclusion in PA settings has been widely discussed in the literature (Qi & Ha, 2012), and a consensus has been reached regarding the need to modify instruction in order to meet the varied needs of children and adolescents with disabilities (Block, Klavina, & Flint, 2007; Meneal & Davis, 2007). It is through developmentally appropriate tasks and activities that students are challenged at an optimal level, resulting in engagement, skill development, and successful movement experiences. Furthermore, teachers who have an ample repertoire of possible modifications for students

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with disabilities are more likely to have success when including those individuals in different PA settings (Block, Provis, & Nelson, 1993). Accordingly, given the growing number of individuals with disabilities in colleges and universities, it is critical that PA instructors at this level are equipped with a substantial set of task, activity, and environmental modifications that are suitable for the higher education population.

One approach for developing a solid set of modifications for various physical activities is to use Newell’s (1986) model of constraints. According to this model, learning is a result of interactions among the individual, the environment, and the tasks (Newell, 1986). Understanding individual constraints and how they interact with the environment and the task is critical for designing appropriate activities leading to learning and enjoyment of various types of PA (Menear & Davis, 2007). The purpose of this article is to use Newell’s model of constraints to present a series of modifications for net/wall games that are designed to promote the inclusion of students with disabilities in higher-education PA programs. This article includes a discussion about inclusion in higher-education PA programs, a description of the concept of net/wall games, a series of modifications for net/wall games according to Newell’s model of constraints, and examples of specific modifications for net/wall games designed to include students with cerebral palsy and visual impairments.

Inclusion in Phy Educ

Physical activity instructional programs refer to PA courses in higher education that provide students with the knowledge,
skills, and dispositions necessary to participate in various forms of physical activity for a lifetime (National Association for Sport and Physical Education [NASPE], 2007). Such courses include, but are not limited to, team sports (e.g., volleyball, soccer, flag football, basketball), individual sports (e.g., tennis, swimming, martial arts, golf), lifetime/outdoor activities (e.g., cycling, rock climbing, orienteering, dance), and fitness activities (e.g., weight training, conditioning, fitness walking). Although many PA course requirements for graduation have been dropped over the past 40 years (Hensley, 2000), PA courses are still widely offered in U.S. colleges and universities and are an important element of promoting PA habits among young adults. Moreover, research shows a steady increase in the number of participants in college and university activity classes (Roberts, 2011). According to SHAPE America – Society of Health and Physical Educators, “It is imperative that all college students experience education in lifetime activities where they may embrace the intrinsic value of activity prior to the end of their college career” (NASPE, 2007, p. 2). Therefore, in order for all students to receive the full benefits of participating in PA courses (i.e., develop sports-related skills, achieve enhanced levels of physical fitness, and engage in healthy lifestyles), it is important that instructors make the necessary accommodations and modifications to meet the increasing demands of a diverse body of students in the higher-education setting.

Unfortunately, even certified physical education teachers who have received coursework or training in adapted physical education reported feeling unprepared to accommodate individuals with disabilities in PA settings (Ammah & Hodge, 2006; Chandler & Greene, 1995; LaMaster, Gall, Kinchin, & Siedentop, 1998). This becomes an even bigger concern in the higher-education setting, where PA courses are often delivered by graduate assistants, adjuncts, coaches, and contract instructors. These individuals may have little, if any, training in how to teach students with disabilities, little support, and varying levels of pedagogical experience and skills (Russell, 2011; Russell & Chepyator-Thomson, 2004).

In educational practices, inclusion refers to the philosophy that all students, regardless of ability level, should be educated in the same environment (Block, 2007). Accordingly, the intent of providing accommodations to students with disabilities is to promote equality and to avoid discrimination (Petrie, Power, & Swallow, 2009). In order to foster inclusion, the ADA (2008) requires physical environments, courses, and academic programs to be accessible to all students who have a disability. In higher education, auxiliary aids and reasonable accommodations for academic adjustments are determined based on individual needs (Barfield et al., 2007). According to the ADA, a major criterion for academic adjustments is that they do not alter the fundamental nature of the program or activity (Barfield et al., 2007). For this reason, it is crucial that PA instructors develop an understanding of how to provide students with disabilities appropriate modifications and accommodations that do not change the nature of specific sports and physical activities and that produce learning, engagement, and successful experiences.

The Concept of Net/Wall Games

Bunker and Thorpe (1982) introduced teaching games for understanding (TGU), a teaching approach in which games are classified by similar conditions, goals, and tactics. This approach focuses on developing an understanding of the concepts, tactics, and strategies of games that are similar, which enables learners to transfer this understanding among games within the same category (Kirk & MacPhail, 2002). At the core of the TGU approach is the idea of modifying games in order to meet the developmental levels of the learners with the purpose of promoting successful experiences and developing an understanding of games concepts. The four categories of games proposed by the TGU approach are (1) invasion games (e.g., soccer, basketball, football, hockey), (2) striking and fielding games (e.g., baseball, cricket, softball), (3) target games (e.g., golf, archery, bowling), and (4) net/wall games (e.g., volleyball, tennis, badminton; Kirk & MacPhail, 2002).

In net/wall games “teams or individual players score by hitting a ball into a court space with sufficient accuracy and power that opponents cannot hit it back before it bounces once (as in badminton or volleyball) or twice (as in tennis or racquetball)” (Mitchell, Oslin, & Griffin, 2003, p. 7). Badminton, tennis, and volleyball are examples of net games, while squash and racquetball are examples.
This allows individuals with disabilities to benefit from participation in PA in the same way as individuals without disabilities. Because individual constraints vary according to different disabilities, task and rule modifications should be guided by an understanding of how individual constraints interact with the environment. The goal is to make appropriate adjustments to the task and/or environment in ways that result in successful experiences for all students, independently of their individual constraints. The following sections will present specific examples of how to use Newell’s model of constraints to facilitate the inclusion of students with cerebral palsy and visual impairments in net/wall games in college and university PA courses.

**Including Individuals with Cerebral Palsy:** Individuals with cerebral palsy (CP) have critical constraints that must be considered when modifying a task or activity. Cerebral palsy is generally defined as a condition that results from injury to the parts of the brain responsible for muscle control, movement, and balance, which occurs before, during, or slightly after birth (National Dissemination Center for Children with Disabilities, 2013). Depending on the location and severity of the damage to the brain, CP can range from mild to severe and can impact muscle control in certain parts of the body or throughout the entire body. For example, some individuals with CP may walk with just a slight limp, while others may require a wheelchair to move around.

Functional constraints are often classified by the Gross Motor Disability Classification System (GMDCS; Palisano et al., 1997). These classifications range from level 1, characterized by individuals who can perform regular motor skills on their own but whose speed, balance, and coordination are low, to level 5, characterized by individuals who must be pushed in a wheelchair at all times and who have difficulty holding posture (Blair & Stanley, 2010). The individual's functional level will determine the extent of the task or environment modification. Using Newell's model as the foundation for modifications design, the environment and tasks can be adjusted to meet the constraints of students who have CP. For example, individuals with ataxic CP often have low muscle tone which makes it difficult to hold a racket, swing it, and hit a ball. Changing the racket size and weight or using a Velcro glove to assist with gripping the racket handle are task modifications that will...
enable the individual to successfully engage in net/wall games that require racket handling.

Another example of an accommodation for students with CP in net/wall games is the addition of a peer helper during game play. Since spatial awareness and court positioning are two key concepts in net/wall games (Griffin, 1996), and since individuals with CP may be limited in their ability to move quickly into a space, the peer helper can physically catch a ball for an individual with spastic CP who can then volley the ball back into play. Table 2 presents examples of modifications designed to include individuals with CP in the game of tennis.

**Including Individuals with Visual Impairments.** Visual impairment (VI) refers to a functional limitation of the eye(s) or visual system due to a disorder or disease (American Optometric Association, 2007). Individuals with a VI fall under one of three categories: low vision, functionally blind, and totally blind. The functional ability of the eye itself is a structural constraint that directly affects the functional constraints associated with individuals with VI. Examples of functional constraints are low balance, difficulties with gait, delays in motor ability, and postural deviations (Winnick, 1985). The addition of a beep ball or a visually stimulating colored ball is an example of a simple equipment modification that will assist individuals with VI to respond in net/wall games. Likewise, the introduction of sound cues, peer helpers, and sensory-stimulating boundary markers are modifications to the environment that will enable successful participation in various net/wall games. Table 3 provides examples of modifications designed to promote appropriate inclusion of individuals with VI in the game of volleyball.

### Summary

The number of students with disabilities in higher-education settings has been growing over the past decade. As a result, colleges and universities have been challenged with the task of providing appropriate services and accommodations for students with disabilities. Despite the progress that has been achieved in providing

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**Table 2.**

<table>
<thead>
<tr>
<th>Equipment Modifications</th>
<th>Rule Modifications</th>
<th>Environmental Considerations</th>
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</thead>
<tbody>
<tr>
<td>Modified net:</td>
<td>Allow the ball to bounce once or more than once, depending on original rules of the game</td>
<td>Create a larger boundary area for the player to hit the ball into</td>
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<tr>
<td>• Open net</td>
<td></td>
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<tr>
<td>• Multiple heights</td>
<td></td>
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<tr>
<td>Modified racket:</td>
<td>Allow the player to serve from a closer proximity to the net</td>
<td>Create a smaller boundary to receive balls</td>
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<tr>
<td>• Shorter handle</td>
<td></td>
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<tr>
<td>• Larger head size</td>
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<tr>
<td>• Modified Velcro grip</td>
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<tr>
<td>Modified ball:</td>
<td>Allow for a sideline partner/coach who can perform assisting tasks</td>
<td>Consider appropriate surface. Play on smooth concrete or indoor surfaces rather than clay, Har-Tru, or grass</td>
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<td>• Low compression ball</td>
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<td>• Wiffle ball</td>
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**Table 3.**

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<th>Equipment Modifications</th>
<th>Rule Modifications</th>
<th>Environmental Considerations</th>
</tr>
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<tbody>
<tr>
<td>Modified net:</td>
<td>Allow the player to catch the ball and then volley it</td>
<td>Create a larger boundary area for the player to hit the ball into</td>
</tr>
<tr>
<td>• Open net</td>
<td></td>
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<tr>
<td>• Bright tape outlining the net</td>
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<tr>
<td>Additional equipment:</td>
<td>Allow the player to be &quot;all-time-server&quot;</td>
<td>Consider sun exposure and lighting</td>
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<tr>
<td>• Player hits ball off tee</td>
<td></td>
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<tr>
<td>• Player hits ball out of the hand of a peer helper</td>
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<tr>
<td>Modified ball:</td>
<td>Player can score points by simply hitting the ball</td>
<td>Mark boundaries with bright tape or cones as a visual aid</td>
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<tr>
<td>• Volley trainer</td>
<td></td>
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<tr>
<td>• Bright highlighted ball</td>
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<tr>
<td>• Bell/beep ball</td>
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academic services and support for students with disabilities, little has been done to prepare PA instructors in higher education to make accommodations for students with disabilities. While the number of colleges and universities that require mandatory PA classes has been decreasing, elective PA courses still play a critical role in promoting active lifestyles among young adults. Hence, it is important that instructors of higher-education PA courses be equipped with resources that allow for modifications and accommodations that will ultimately result in inclusion.

Because individuals with disabilities possess specific individual constraints (e.g., visual impairment, orthopedic impairment, cognitive or emotional limitation), it is critical that instructors make changes in the environment and tasks in order to meet the needs of the growing body of diverse students in college and university PA courses. Newell's model of constraints is a useful framework to use in determining modifications that can be employed in several net/wall games. Because net/wall games (e.g., tennis, volleyball, badminton, squash) are based on similar skills, concepts, and strategies, they also have similar environmental and task constraints. Modifications of those constraints can be used across multiple sports, providing instructors with a wide range of possibilities to promote inclusion in higher-education PA courses.

Finally, this article presented specific examples of how to make appropriate modifications to include individuals with cerebral palsy in tennis and individuals with visual impairments in volleyball. In addition to providing a foundation for further development of inclusion guidelines for other sports, this article intends to help take the guesswork out of how to appropriately include an individual with a disability in a higher-education PA class, providing practical knowledge that can be applied for successful inclusion.

References


