

PROFILES OF DOMINANCE IN PHYSICAL EDUCATION

Deborah Stevens-Smith

*Eugene T. Moore School of Education, College of Health,
Education & Human Development, Clemson University, Clemson, USA*

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Abstract:

The purpose of this study was to determine the dominance preferences of physical educators and the impact the profiles can have on pedagogical knowledge in the teaching/learning environment. Participants completed a self-assessment of dominant preferences survey in the areas of the brain hemisphere, eye, ear, hand and foot preference. Chi-square and cross-tab analysis were used to analyze the data according to age, sex, and teaching experience. A basic dominance profile for physical educators in the study was determined and the results revealed a profile of equal distribution for left and right-brain dominance and predominantly the right eye, ear, hand and foot preferences for the group. The profile for this group of physical educators was different from the profile of educators in previous research. The strengths of the left-brain dominants were in the visual, auditory, and movement preferences, while the weaknesses were in the kinesthetic preferences. The strengths for the right-brain dominants were only in the kinesthetic preferences, while the weaknesses were in the visual, auditory, and movement areas.

Key words: *hemispheric dominance, learning styles, preferences*

Introduction

Educators, psychologists and physicians have looked for years to find ways to address the differences that make classrooms unique. Various learning style assessment techniques and theories have been used to examine the different ways that teachers and students learn. A learning style “describes a student in terms of those educational conditions which he/she is most likely to learn” (Hunt, 1979). Jonassen and Grabowski (1993) found that individual learning styles develop as a result of heredity, past life experiences and demands linked to environmental circumstances where both strong and weak points develop. Howard Gardner (1985) and Dunn and Dunn (1992) developed assessment systems that addressed the differences in teaching and learning style. The Myers-Briggs Index (Myers, 1975) and Howard Gardner’s (1985) multiple intelligence theory are useful tools for assessing learning styles. Educators have traditionally used these assessment techniques to try to understand the different ways to approach teaching and learning.

Learning style theorists continue to debate the impact that learning styles can have on the teaching and learning process. Some researchers have challenged the reliability of Dunn and Dunn’s

assessment system (Stellwagen, 2001) and the Myers-Briggs Index (Gregory, 1996), while others (Andrews, 1990; Klavas, 1994) judged the instruments as valid and reliable in determining student preferences for learning.

Research suggests that students learn best when the teaching style and learning styles match (Brandt, 1990; Wakefield, 1993). Yet, Barbe and Milone (1981) found that teacher’s instruct most often according to their predominant learning style. Many teachers are not aware of their own dominant learning preferences, so they simply teach the same way in which they were taught as students. The challenge is to find an appropriate system to determine learning strengths and weaknesses and this can be addressed through the use of dominant preferences (Stevens-Smith, 2008).

One learning style assessment system that has been used is the dominance profile (Hannaford, 2005; Prashnig, 2001; Dennison & Dennison, 1985). A dominance profile is a personal assessment technique that gives information about how we take in and process new learning experiences (Hannaford, 2005). Dominance profiles involve a learning style assessment system that was initiated in previous work by Dr. George Goodheart (2000).

Hannaford (2005) suggests that the dominant profiles develop at approximately nine weeks in utero as the embryo develops the Moro reflex, a protective reflex for survival. It is her belief that dominance represents a function that allows for efficiency of action (i.e. a lead hand to strike out for protection, a lead foot to flee danger, etc., where the action is immediate without thought). Positron emission tomography (PET) scans and electroencephalogram (EEG) show the non-dominant hemisphere of the brain shutting down between 75%-85% during stress, as the brain shifts into an efficient reaction pattern to survive. Higher-level thought is compromised at such times. Since survival is our first function, these dominance patterns become well entrained and become the most efficient way in which we address any new learning. Thus these dominant patterns become our learning style. Dominant selections can be determined for the dominant brain, eye, ear, hand and foot and demonstrate strengths and weaknesses that occur in teaching and learning. The dominance profile is one method of determining learning style preferences as they provide insight into how individuals process information.

The importance of teachers' understanding of various learning styles is related to several educational developments. The increasing awareness of the constructivist theory of learning suggests that traditional methods of teaching may not enhance student learning and traditional teacher-centered styles may not maximize student learning (Miller, 2002). The key to learning a constructivist perspective is active engagement of the student in the learning process, which can be promoted through various learning styles (Prashnig, 2001). The increasing diversity of students and the current standards reform movement are two additional developmental areas supporting the use of various learning styles. With increased diversity, students will have a wide variety of learning needs (Bellanca, 1998; Curry, 1999). The standards reform movement also suggests that by understanding the variety of learning styles inherent in students, teachers can increase performance, thus meeting higher standards mandated by the reform initiatives (Doolan & Hongsfeld, 2000).

Educators need to understand dominance profiles because the research suggests incongruities between the learning preferences of teachers and the preferences of the students they teach (Oxford & Anderson, 1995; Hannaford, 2005). In any classroom, at any level, and in any subject, the information presented may be incompatible with how more than half of the students in the class learn best (Dunn, Cavanaugh, Eberle, & Zenhausern, 1982; Dunn, Dunn & Perrin, 1994). Dominant brain preferences for a large majority of educators show that most are left-brain processors. At least half of the

students in class are right-brain processors with a much higher percentage found in special education classes (Hannaford, 1993). It has been suggested that students will learn faster when instruction is geared to specific student learning styles (Dunn & Dunn, 1978; Hodges, 1983; McCarthy, 1987). Schools teach in specific ways that often do not mirror the primary dominance profile of the children involved. If physical educators are to have a better understanding of their own learning style and that of their students, then this issue needs to be addressed.

There is very limited research that has been completed in the area of dominance profiles, particularly with physical educators. Knowledge in this area can help physical educators determine best teaching practices and applications to enhance learning. Dominance profiles can give the teacher and/or student an understanding of how s/he learns best. This understanding can create an awareness of strengths and weaknesses in one's teaching approach, so that all students are taught according to their inherent learning preferences (Prashnig, 2001). Our current educational system seeks to educate students according to the teacher's primary strengths, while previous research suggests that teaching to the student's preferences can improve academic performance (Yong & McIntyre, 1992; Quinn, 1993).

Dominant preferences in relation to the brain, eyes, ears, hands and feet evolve through environmental and programming influences experienced each day. Basal dominance patterns (patterns reverted to in times of stress) develop at nine weeks *in utero* with the Moro reflex. Individuals then learn to compensate and are able to change the profile to fit the situation as one matures (Merzenich, Kilgard, Pandya, Vazquez, Gehi, & Schreiner 2001). Individuals return to the basal profile under severe stress because both nature and nurture are involved (Hannaford, 2005).

The brain is an important component in determining how we learn, but the brain cannot learn by itself. Eyes, ears, hands and feet are all mechanisms for transporting information to the brain. The hands, eyes, ears and feet provide stimulant information that the brain can use to make appropriate decisions about learning. Although dominant preferences vary over time, ultimately the right or left side of each of these senses will tend to dominate and function more efficiently than the other when it comes to learning. There is no right or wrong, good or bad, better or best, when it comes to dominance. Dominance profiles are simply preferences developed for survival and the completion of certain tasks. These preferences are what enable us to be unique in our teaching/learning abilities.

Hannaford (1997) presents thirty-two different profiles of dominance that reveal learning preferences about how information is processed. The

profiles provide important information for teachers in assessing how to approach the variety of learning styles we encounter each day. Figure 1 shows how the thirty-two profiles can be categorized into three broad categories of cross-lateral dominance, homolateral dominance, or mixed dominance (Hannaford, 1997).

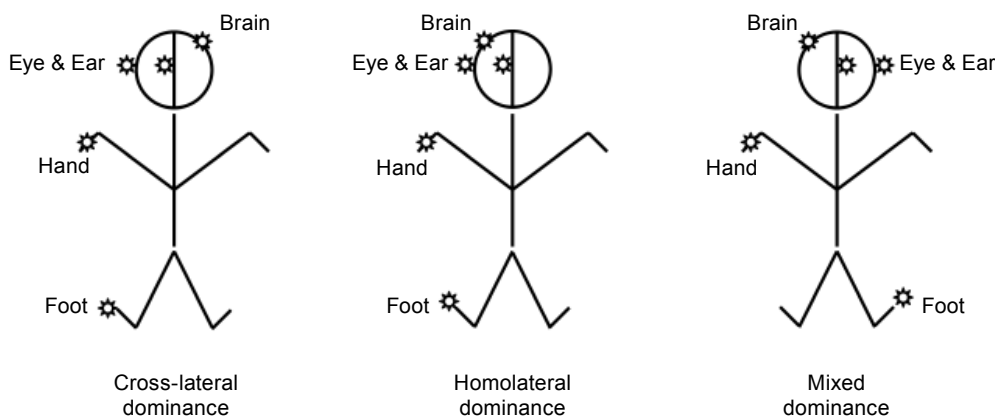


Figure 1. Categories of dominance

Cross-lateral dominance occurs when the dominant brain hemisphere is opposite the four dominant senses of eye, ear, hand, and foot. This individual would be left-brain, right eye, ear, hand, and foot. This individual generally manages well in the teaching environment. The opposite profile (right-brain, left eye, ear, hand, and foot) involves an individual that is very kinesthetic and needs to be constantly moving in the classroom. This can be distracting to teachers because these students have a difficult time discerning the details if they are under stress.

Homolateral dominance occurs when the dominant brain hemisphere is on the same side as the four dominant senses. This individual could be right-brain, right eye, ear, hand, and foot or the opposite. Participants with this profile have difficulty learning because the non-dominant hemisphere is controlling all of the dominant senses (Hannaford, 1997, 2005). Because the dominant hemisphere is not controlling the dominant senses it will be difficult to talk coherently, see, or hear effectively. Understanding this process would be similar to asking a right-handed/left-brain dominant person to write using their left hand. They can write, but the process would not be as easy or efficient because the neural pathways are not as enhanced as those in the dominant right hand.

Mixed dominance profiles show dominance of one brain hemisphere with one or more of the dominant functions for eye, ear, hand, or foot on the opposite side. The profile for this individual would vary with left-brain, right eye and ear, and left hand,

or foot (or any other mixed sequence of right and left senses). This profile can produce any number of learning difficulties depending on the individual sense that is on the same side as the dominant brain hemisphere. In mixed dominance you must look at each profile individually to determine how they specifically function (Hannaford, 2005).

Research shows that we teach according to our predominant learning style, which is directly reflected, in our dominant preferences (Prashnig, 2001). Left-brain dominants prefer details and organization, while right-brain dominants prefer to see the big picture and experience the emotion involved in learning. Our educational systems are set up to favor the left-brain learner, so that the right-brain dominants are often diagnosed with learning problems and placed in special education classrooms (Hannaford, 2005; Prashnig, 2001). Understanding the dominance profile can enable educators to determine strengths and weaknesses inherent in the teaching process.

Past research (Kulinna & Cothran, 2003) lends some insight into the learning preferences of physical educators, but additional research is needed. Being able to identify learning preferences and use them as a basis for improving instruction is very important for educators in assisting all students in both academic and skill improvement (Stevenson & Dunn, 2001).

This research study examined baseline dominance profiles for physical educators throughout the United States. The factors that were examined included age, sex, region of the United States, and years teaching experience to determine how they impact or influence dominant selections. The physical education profile was also examined in terms of strengths and weaknesses in the teaching and learning environment. Although a limited amount of research exists in the area of dominance profiles and physical education, insight can be gained from the

implications that this study provides. The research questions that guided this study were: (1) what are the primary dominant preferences of the physical educators and those in related fields tested in this study?, (2) what factors impact dominant preferences?, and (3) within the dominant preferences, what strengths and weaknesses are evident that could impact pedagogical knowledge?

Methods

Participants

The survey included 698 participants in physical education and related fields. The sample included those listing their majors in kinesiology, exercise science, sports management, fitness, athletic training, and sport psychology. The survey included participants 19-64 years of age from 48 states (all except Arkansas and Nevada) with teaching experience ranging from 0-40 years. Table 1 describes general information and demographics about the participants.

Survey

Dominance profiles were collected in a convenience sample over a period of six years on teachers and students in physical education and related fields through an on-line survey. The survey enabled participants to conduct a self-assessment of their dominance profile in the areas of brain, eye, ear, hand, and foot dominance. Each participant was asked to determine if the dominant sense (brain, eye, ear, hand or foot) was primarily right dominant, left dominant or unsure. If participants were unsure of their dominant preferences in the brain, eye, ear, hand, or foot, then they were left out of the group analysis.

The survey utilized Hannaford’s (1997) self-assessment system for determining dominant brain hemisphere, eye, ear, hand, and foot preferences. Brain dominance was determined by giving participants a list of characteristics describing the left and right hemisphere preferences (Table 2). The dominant brain hemisphere is important in relation to each of the dominant senses because it sets up our

Table 1. Participants/Demographics

Sex	USA	Teaching experience	Age	Birth years
65.8% F	17.9% West	27.7% 0 years	13.4% 19-21	1933-1944 2.8%
34.2% M	52.7% South	25.7% 1-10 years	26.1% 22-31	1945-1954 21.3%
	15.4% Midwest	20.4% 11-20 years	16.8% 32-41	1955-1964 24.1%
	14% Northeast	26.1% 21-40 years	43.6% 42-64	1965-1974 16.4%
				1975-1984 33.6%
				1985-1994 1.6%

Legend: F-female, M-male

Table 2. Brain dominance characteristics

Left Brain Characteristics

- Logic hemisphere
- Deals mainly with detail
- Logical in thoughts
- Likes routines, files, sequences, details
- Steps in A-B-C/1-2-3 order
- Predictable
- Follows directions specifically
- Good at computations
- Checkbook balanced
- Very organized
- Note-takers and list-makers
- On-time
- High verbal skills
- Studies in a formal setting with bright lights and limited distractions

Example: When watching a football game, the left-brain dominant may watch a receiver going out for a pass, but miss the fact that someone else scored a touchdown!

Right Brain Characteristics

- Gestalt hemisphere
- Deals with the big picture
- Less sense of time
- Emotional
- Good intuition
- Visionary
- Develops grand ideas
- Good humor
- Spontaneous
- Study anywhere
- Talks using their hands
- Problem-solves out loud
- Great with faces
- Guess with the checkbook
- Operates from piles, not files

Example: When watching a football game, they may see that a touchdown has been scored, but cannot tell you what position was used to score.

preferred way to process information. The left brain dominant (logic) processes information in a logical format. This processing focuses on details, organization and a step-by-step process. The right brain dominant (Gestalt) processes information by looking at the big picture and creating grand ideas.

The survey enabled participants to conduct a self-assessment of their dominance profile in the areas of brain, eye, ear, hand, and foot dominance. Each participant was asked to determine if the dominant sense (brain, eye, ear, hand or foot) was primarily right dominant, left dominant or unsure. Brain dominance was determined by giving participants a list of characteristics describing the left and right hemispheres as determined by Hannaford (2005) and Prashnig (2001) in previous research. The characteristics of each hemisphere are simplified so that individuals can assess individual learning styles through the knowledge of how they process information each day. Hemispheric characteristics are evidence of the different ways we process information, but may appear as strengths or weaknesses in different learning situations. Eye, ear, hand, and foot preferences were determined through a variety of techniques and questions that enabled the participant to determine the dominant sense. The specific instructions for determining each of these preferences can be found on the survey site at <http://itcenter2.clemson.edu/DPSurvey/>. The techniques and characteristics for each test were taken from previous research instruments with demonstrated validity for the instrument's use.

Data collection

Data was collected through university/college professors requesting classes to participate using an on line survey. In addition, all fifty state physical education associations were contacted and asked to advertise the survey on their state physical education web sites. Several national physical education sites (PE Central, PE Links 4-U) also agreed to provide a link to advertise the survey. Completion of the survey was voluntary and anonymous.

Data analysis

Data from the online survey was collected at a central administrative site into an Excel file for analysis. This study used descriptive statistics that were analyzed using SPSS. In addition, chi-square and cross-tab analysis were used to analyze the data according to age, sex, teaching experience, and regions of the USA. The use of differing variables was initiated to determine what variable(s), if any, might impact dominant selections because the research in this area is very limited. Although a trend was evident in several variables (age and regions of the USA), the lack of significance halted further discussion.

The analysis generated by using a convenience sample makes it difficult to generalize the results to those teaching in the physical education field. However, the large sample size in this study would differ little from the inherent characteristics of an ideal random sample. The physical educators that were asked to participate represent an approximate sample of the number of male/female physical education teachers across the USA in terms of age, location and varied levels of teaching experience that characterize the intended population. However, because of the limitations of convenience samples the results of this research will be generalized only to the population surveyed in this study.

Validity

The validity and reliability of Hannaford's self-assessment of dominance is based on the work of Dunn and Dunn (1994) and Herrmann's (1990) Brain Dominance Instrument (HBDI). The Dunn and Dunn Learning-Style Model has spawned several diagnostic instruments to evaluate learning style; the first was introduced in 1976. There is evidence based on accepted measurement standards that the scores produced by each of these instruments provide a reliable guide to a person's thinking profile (Kirby, 1979). The content validity of the self-assessment model appears to be very high because the model is easy to understand and to visualize because participants are familiar with the bilateral symmetry of their body parts and with known personal preferences for eye, ear, hand and foot. This conceptual familiarity is an aid to content validity and the generalizations that can be made from the resulting data.

Results

Demographics: Six hundred and ninety-eight participants completed the survey with 65.8% females and 34.2% males. The subjects ranged in age from 19 to 64 years, with teaching experience from 0 to 40 years. The subjects were grouped for the purpose of analyzing the data in the categories of age, sex, teaching experience and regions of the USA to determine if any trends are evident in the data. In a cross-tab analysis of brain dominance with age and state regions, no significant differences were found. Significant differences were evident based on left or right brain preferences and the number of years teaching experience.

Physical Education profile

The overall profile of the physical education participants showed that the sample favored an equal balance of brain dominance with preferences for the right eye (65.6%), right ear (60.7%), right hand (89.8%), and right foot (82.3%) dominance. Brain dominance was basically equal (left-brain 50.7%

and right-brain 49.3%), but all the other senses were predominately right-sided (Figure 2). Previous research on brain dominance demonstrates that brain preferences change as we grow and experience the environment around us. Comparisons from past research with this study are difficult because this study examined a selected group of physical educators from 19 years of age and up. Cross-tab analysis showed there was a greater percentage of males as a group that were left-brain (55%) versus right-brain (45%) dominant and only a slightly greater percentage of females that were right-brain (50.9%) versus left-brain (49.1%) dominant within each sex category. In the cross-tabulations there were no significant differences in the sex by brain, eye, ear, hand, or foot dominance.

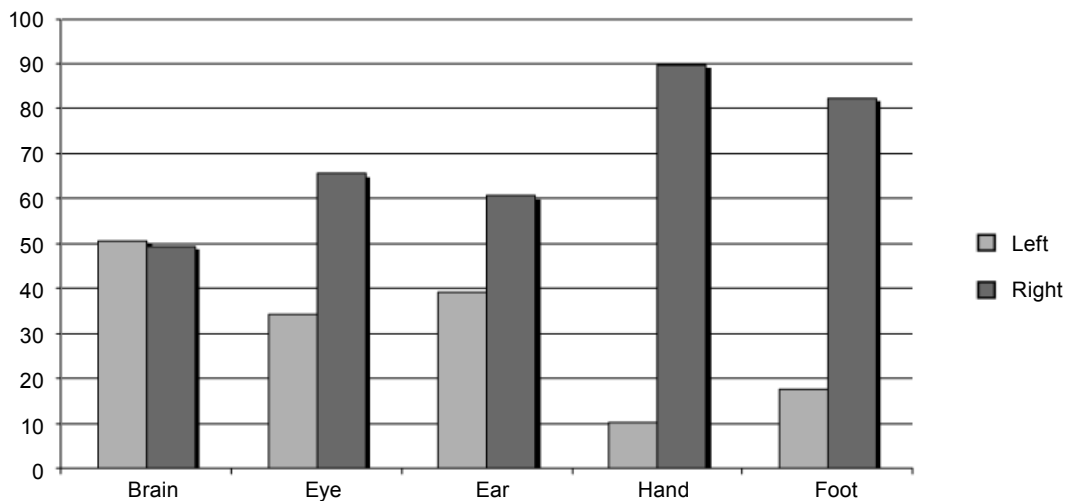


Figure 2. Overall Physical educator profile.

At all levels of teaching experience the majority of participants were right-eye and right-foot dominant. In the years teaching experience categories of 0 years, 1-10 years, and 11-20 years a higher percentage of subjects were right-brain dominant (54.2%, 50.9%, and 60%, respectively). In the 21-40 years teaching experience group a higher percentage of the participants were left-brain dominant and this difference was significant ($p < .003$). After 21 years of experience, something occurs that evidenced the left hemisphere becoming dominant for 62.7% of the teachers and 37.3% developed right brain dominance. In the first 10 years of teaching, almost twice as many teachers were right ear dominant. After 11 years of teaching experience, they showed an equal balance between left and right ear dominance.

Categories of dominance

Hannaford's (1997) self-assessment instrument produces a variety of combinations of profiles (i.e., right brain, left eye, left ear, right hand and foot,

etc.) that can be grouped into three categories: cross-lateral dominance, homolateral dominance, and mixed dominance profiles. These three categories of learners evolve from the thirty-two different profile combinations that resulted from the assessment instrument. Significant differences were evident between brain hemisphere preference and all three categories of dominance ($p < .001$).

Cross-lateral dominance was evident in 20.2% of the participants in this sample where 92% were left-brain dominant and 8% were right-brain dominant. This left brain, right eye, ear, hand and foot profile has been identified with the individual that generally manages well in the classroom because the dominant brain hemisphere is opposite the dominant senses.

Homolateral dominance was evident in 20.5% of the sample where 9% were left-brain dominant and 91% were right-brain dominant. Individuals with this profile have difficulty with learning because all of the dominant senses are on the same side as the dominant hemisphere. This group often experiences difficulty with verbal communication and shut down under stress, making it difficult to see, hear and move efficiently.

Mixed dominance profiles were seen in 59.3% of the sample and have been found in a large percentage of individuals that experience learning disabilities. The sample showed 52% were left-brain dominant and 48% were right-brain dominant. Problems are evident in this type of dominance because the dominant hemisphere is not controlling one or more of the dominant senses.

Discussion and conclusion

The purpose of this study was to determine the primary dominant preferences of physical educators and those in related fields, factors that influence

those preferences, and how that knowledge can impact pedagogical teaching in the physical education arena. The constructivist theory of learning suggests that what is happening in our present educational system is not what is best for all learners to be successful. Traditional teaching styles may not maximize learning, but the use of dominant preferences and learning styles can reach all learners (Miller, 2002).

An important consideration is how the individual processes information in the brain. Brain processing influences all other preferences and styles of the person (Prashnig, 2001). The participants in this study showed an equal balance between left (logic dominant) and right brain (Gestalt dominant) participants. If future research were to parallel this physical education population, then this equal balance could aid in addressing the needs of all types of learners in the physical education environment. Research shows a large majority of students in the elementary school are right-brain processors, whereas most teachers are left-brain processors (Dunn & Dunn, 1992; Dunn, 1993; Dunn, Dunn, & Perrin, 1994). As children develop and progress through the school system, many become left-brain processors. Future research could provide important information regarding whether the dominant preferences of teachers and students are alike or different, as they move through the educational system.

The dominant profiles for the eye, ear, hand and foot were predominantly right-sided for this sample. These preferences can develop from both environmental and societal influences that come with living in a right-hand oriented society (Linke & Kersebaum, 2005). As a group, physical educators are very logical, detailed oriented, verbal, visual and good movers. The profiles of this group of physical educators differ from that of classroom teachers from past research. Does the nature of the physical education environment alter the preferences involved in teaching? Hannaford (1993) found that 75% of classroom teachers in her study were left-brain, left ear, right eye and hand. Most of the classroom teachers were verbal learners so they talked a lot, did not hear (would not listen) and expected students to look at them when they talked. Other studies have also found differences in dominant preferences according to gender, major, and socioeconomic status (Dunn, Sklar, Beaudry, & Bruno, 1990; Lavach, 1991; Oxford, 1996).

The results in this study showed, as a group, a greater percentage of males that were left-brain dominant and females were more equally balanced between right and left-brain dominance. Past research (Gur, et al., 1995; Shaywitz, et al., 1995; Sosa, 1995) have found more females are left-hemisphere dominant and more males are right-hemisphere dominant when compared by age and sex. Explanations for this are unclear. Researchers

suggest that hormones such as testosterone seem to delay the development of the left hemisphere in boys. Environment also plays a large part where girls are more prone to play indoors while boys play outdoors. The structured indoor environment tends to promote greater left-hemispheric development, while the unstructured outdoors promotes right-hemispheric development. The cause of these hemispheric differences is not what is important, but our response to the differences when it comes to learning is what is of most importance. The difference in this study with the males showing more left-hemispheric dominance might be explained by the nature of the teaching environment in physical education. The large, open activity environment requires a form of specialization where organization and left-hemispheric characteristics are advantageous for success.

Teaching experience in this sample had a significant impact on both ear and brain dominance. Teachers with more experience were prone to be left-brain and those with less were mainly right brain dominant. More experience showed more tendencies toward left-brain dominance. American schools are set up to value the logic dominant individuals. Teachers may begin their teaching career with right dominant senses, but appear to accommodate dominant selections in order to function more efficiently in the physical education environment. This change in dominant selections could represent a process of learned compensation. Experienced teachers accommodate to a system that has become very cognitive (left-brained) oriented. Future research is needed to understand more fully these patterns.

Learning differences are assumed to be present between those with differing teaching experience. These differences pertain to the larger amount of knowledge that is acquired through pedagogical practice. Learning styles can play a central role in the classroom and physical education setting. The quality of the learning in which students are involved determines to an extent the quality of the learning results they achieve. "Similar assumptions underlie the constructivist school of thought that arose about a decade ago. The way in which the quality of learning results should be measured is a central point of attention for constructivism" (Vermunt, 2005).

Categories of dominance

The cross-lateral dominant group comprised 20% of the participants where 92% of this group were left-brain dominant. The cross-lateral group manages well in the teaching situation because their preferences fit into the logic dominant educational system. The majority of these teachers will manage well in the learning environment, even under stress. All of the senses are fully accessed, so that

confidence in a variety of approaches can be fully utilized. The eight percent that are right-brain dominant are still at an advantage in the physical education environment because they need to be constantly on the move as they instruct and work with students in a physical activity setting.

The homolateral group included 20% of the sample where nine percent were left-brain dominant and 91% were right-brain dominant. Under stress these teachers will find it difficult to communicate verbally and will find it difficult to see, hear or move efficiently. Teachers that are right-brain dominant are at less of a disadvantage in the physical education environment. Physical education involves a combination of both logical processing (parts, details, strategies) and Gestalt processing (big picture, overall objective, game and skill outcomes), whereas the classroom teacher is oriented towards elements of learning that are basically logical left-brain processing.

The mixed dominance group was the largest dominance category at 59% of the sample. Teachers with a mixed dominance profile may have difficulty processing information in several different senses. Teaching in the physical education area allows for a variety of teaching techniques that include all types of learning (verbal, auditory, visual) including the psychomotor component (kinesthetic). It is not surprising that mixed dominance is the largest category because physical education requires a greater variety of instructional techniques. Problems present themselves in the mixed profile because the dominant hemisphere does not control one or more of the dominant senses. The teacher could have a mixed array of strengths and weakness when they teach. The inherent physical environment provides for optimal use of a variety of teaching styles that affect both left- and right-brain learners.

Implications

The theoretical framework for this study centered on the constructivist theory of learning. Physical educators and their students are able to construct their own knowledge to understand how they can learn best. The use of dominant preferences and learning styles are an ideal method to enhance this construction of knowledge. When we can determine our strengths and weaknesses in learning, then our brains and bodies can function more efficiently (Miller, 2002). Physical educators are a unique group to study in terms of dominance profiles. The nature of the environment in which they teach provides a blend of preferences that are varied in strengths and weaknesses. The strengths of this

sample were in the visual, verbal, and movement areas. Weaknesses for this sample were in the auditory and communication area.

If we know our dominance profiles, then we can understand and anticipate areas where we may have difficulty with particular tasks and types of information. We cannot change our dominant preferences, but we can compensate for our preferences to some degree. Understanding the various dominant preferences in the teachers in this physical education setting can augment performance and inherently impact the higher standards mandated by legislative initiatives. Walker and Lambert (1995) state "constructivism is a theory of learning, but it is also a theory of knowing" (p. 1). When teachers know how to teach to the variety of learning differences in the physical education environment, then true knowledge has been constructed.

Addressing any aspect of the dominance issue can give the teacher the opportunity to be more successful. Knowing our dominant profile and how we preferentially teach brings awareness to the diversity of learners. Physical Education teachers have a distinct advantage in that they are working with students using movement. Movements activate whole brain functioning and enables the individual to go past the dominant preferences set up for survival to whole brain/body functioning.

Conclusion

The physical educators in this study have a unique opportunity to teach in an environment that can effectively stimulate both left- and right-brain learners. Through an understanding of dominance preferences the opportunity is also available to enhance visual, auditory, and kinesthetic learning preferences. Teaching to the variety of different learning styles in a physical education setting can enhance meaning, learning, retention, understanding, and skill development in a powerful way.

Determining one's own dominant preferences and that of others helps us to understand areas of strengths and weaknesses in the learning environment. When these preferences can be addressed, then physical educators will have a better understanding of how to reach learners and enhance teaching. They can also develop an appropriate movement curriculum that activates whole brain functioning for themselves and their students, thus optimizing the ability to learn fully. The increased understanding of dominant preferences can enable educators to be better prepared to change and improve student-learning opportunities.

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Correspondence to:

Dr. Deborah Stevens-Smith

Eugene T. Moore School of Education

College of Health, Education & Human Development

408 Tillman Hall

Clemson University

Clemson, SC 29634-0705

Phone: 864-656-5124

Fax: 864-656-1322

E-mail: Stevens@Clemson.edu

PROFILI DOMINIRAJUĆIH STRANA TIJELA U TJELESNOM ODGOJU

Sažetak

Uvod

Proučavali su se osnovni profili dominacije strane tijela za nastavnike tjelesne i zdravstvene kulture u SAD-u. Faktori su uključivali godine, spol, regiju SAD-a te godine nastavnčkog iskustva, radi utvrđivanja njihove korelacije s izborom dominantne strane tijela. Istraživačka pitanja bila su: 1) koje su primarne pogodnosti dominacije određene strane u nastavnika; 2) koji faktori utječu na preferenciju strane tijela i 3) u sklopu preferiranja dominacije lijevo/desno, koje su prednosti i nedostaci očigledni, a mogu utjecati na pedagoške spoznaje.

Metode

Istraživanje je provedeno na 698 ispitanika, nastavnika TZK (65,8% žena i 34,2% muškarci), dobi od 19 do 64 godine, iz 48 saveznih država SAD-a, s nastavničkim iskustvom od 0 do 40 godina. Osnovni deskriptivni parametri izračunati su statističkim paketom SPSS. Za analizu podataka o dobi, spolu, nastavničkom iskustvu i prebivalištu koristili su se χ^2 test i *cross-tab* analiza. Profili dominacije prikupljali su se na prigodnom uzorku učitelja i studenata *kineziološke edukacije* i srodnih područja on-line upitnicima u razdoblju od 6 godina. Upitnik je omogućio ispitanicima auto-procenu vlastitog profila dominacije lijeve/desne strane: mozga, oka, uha, ruke i noge. Svaki je ispitanik odredio je li njegovo/njezino dominantno osjetilo, odnosno organ bio primarno na desnoj ili lijevoj strani tijela, odnosno neodređeno. Opisi testova i mjerne procedure za svaki test bile su preuzete od prethodnih istraživanja.

Rezultati

Ispitanici su bili raspoređeni u grupe po dobi, spolu, prebivalištu (savezna država) te godinama iskustva. U *cross-tab* analizi povezanosti dominacije strane mozga s godinama i prebivalištem nisu pronađene statistički značajne razlike, no nađene su u analizama korelacija u dominaciji lijeve ili desne hemisfere mozga s brojem godina nastavnčkog iskustva.

Ukupni profil ispitanika pokazao je da je uzorak u jednakom omjeru odredio dominaciju lijeve, odnosno desne hemisfere mozga (lijeva strana mozga 50,7%, a desna strana mozga 49,3%), s preferencijama desnog oka (65,6%), desnog uha (60,7%), desne ruke (89,8%) i desne noge (82,3%). *Cross-tab* analiza pokazala je da se veći postotak muškaraca odredio kao osoba kojoj je lijeva strana mozga dominantna (55%), dok je desna strana mozga dominirala u 45% ispitanika. Ispitanice su se vrlo izjednačeno podijelile prema dominaciji hemisfere mozga (50,9% desne naspram 49,1% dominacije lijeve hemisfere mozga). U svim dobnim skupinama prema nastavničkom iskustvu većina je ispita-

nika bila opredijeljena za dominaciju desnog oka i desne noge. Dobivena je statistička značajnost ($p < .001$) između godina nastavnčkog iskustva i dominacije uha.

Hannaford (1997) je predstavio 32 različita profila dominacije koja otkrivaju preferencije u procesuiranju informacija u procesu učenja. Kros-lateralna dominacija bila je uočena u 20,2% ispitanika u uzorku u kojem je 92% ispitanika bilo određeno da njima dominira lijeva hemisfera, a tek 8% s dominacijom desne hemisfere mozga. Homolateralna dominacija bila je uočena u 20,5% ispitanika u uzorku u kojem je 9% ispitanika imalo dominantnu lijevu hemisferu i 91% dominantnu desnu hemisferu. Miješana dominacija profila mozga primijećena je u 59,3% ispitanika te u velikom postotku osoba s poteškoćama u učenju.

Rasprava i zaključak

Konstruktivistička teorija učenja navodi da ono što se događa u našim sadašnjim edukacijskim sustavima nije dobro za sve učenike. Tradicionalni stilovi učenja, budući da ne odgovaraju svim učenicima, ne pogoduju brzini učenja ni postotku ni dužini retencije znanja, stoga bi stilovi poučavanja koji vode računa o dominantnim stranama mozga i tijela mogli doprijeti do svih učenika.

Vrlo je važno u obzir uzeti kako pojedinac procesira informaciju u svom mozgu. Procesiranje u mozgu utječe na ostale preferencije i stilove pojedine osobe. Ispitanici su u ovom istraživanju pokazali izjednačenost u dominaciji lijeve i desne hemisfere mozga. Istraživanja pokazuju da u većini učenika u osnovnim školama dominira desna hemisfera, dok je većina učitelja s dominantnom lijevom hemisferom mozga.

U ovom uzorku ispitanika profili dominacije za oko, uho, ruku i nogu su dominantno desni. Kao grupa, nastavnici TZK su vrlo logički nastrojeni, orijentirani prema detaljima, verbalni, vizualni i osobe s ekonomičnim i koordiniranim kretnjama. Naš sustav edukacije favorizira učitelje (i studente/učenike) koji informacije procesiraju linearnim putem, ali osobe koje tako procesiraju informacije predstavljaju tek 15% testirane populacije. To su pojedinci s vjerojatno visokim samopouzdanjem i manje su podložni stresu budući da su nastavni zadaci postavljeni upravo prema njihovim mogućnostima procesiranja. S manje stresa takvi učitelji mogu puno lakše doprijeti i brinuti se o svim vrstama učenika.

Rezultati ovog istraživanja pokazuju da u muškarca prevladava dominacija lijeve hemisfere mozga, dok je u žena dominacija hemisfere vrlo ujednačena. Aktivnosti koje se provode na širokim, otvorenim prostorima preferiraju osobe s dominantnom desnom hemisferom mozga budući da je vrlo dobro dokumentirano da je desna strana mozga superiornija za prostorno procesiranje. Nastavničko iskustvo utjecalo je kod naših ispitanika na promjene u

dominaciji strane i uha i mozga. Dominacija desnog uha bila je zabilježena kod dvostruko više učitelja u prvih deset godina predavanja, ali se uravnotežila kod učitelja koji su imali veći radni staž. Učitelji s više iskustva bili su skloniji lijevoj strani mozga, dok su oni s manje iskustva bili osobe s dominantnom desnom hemisferom. Sustav školovanja u SAD-u postavljen je tako da se više cijene pojedinci koji imaju razvijeniju logičku komponentu mišljenja. Testirani učitelji započeli su svoje karijere s preferencijama desne hemisfere mozga, ali su s vremenom promijenili preferenciju i prilagodili dominaciju kako bi učinkovitije funkcionirali. Ta promjena u izboru dominacije mogla bi predstavljati proces naučene kompenzacije. Iskusniji učitelji prilagođuju se sustavu koji je više kognitivno orijentiran (dominacija lijeve hemisfere mozga). Kako god, potrebna su buduća istraživanja na ovom području koja bi potvrdila takve zaključke.

Kada je cjelokupan profil ispitanika bio predstavljen po kategorijama dominacije, dobio se vrlo jasan uvid u prednosti i mane nastavnika TZK-ispitanika. Približno 20% ispitanika pokazalo je kros-lateralan profil, a 20% ispitanika homo-lateralan, dok je u 59% ispitanika otkriven miješani profil dominacije strane. Kros-lateralna grupa ispitanika dobro se nosi sa situacijom vezanom uz procese i stilove poučavanja/učenja, budući da se njihove preferencije uklapaju u edukacijski sustav s dominacijom logičkih procesa poučavanja/učenja.

Ljudi ne mogu promijeniti svoje preferencije dominacije, ali mogu kompenzirati neke preferencije do određenog stupnja. Utvrđivanje svoje i preferencije dominacije u drugih ljudi može nam pomoći da razumijemo područja prednosti i mana u obrazovnom okruženju. Kada te preferencije budu definirane, učitelji će bolje razumjeti kako učenici procesiraju informacije te kako doprijeti do njih, a to će svakako unaprijediti obrazovni proces.