Conductive Education

Theoretical Background

Some theoretical background for the interpretation of the elements of Conductive Education.

Contents

Introduction

Conductive Education is an educational system that has been specifically developed for children and adults who have motor disorders of neurological origin.

Conductive Education's origin lies in the works of Professor Andras Petö. It is based on the premise that a person who has a motor disorder does not only have a medical condition requiring treatment, but very importantly a problem in learning that requires education. During the past three decades, Conductive Education, increasingly known simply by its initials, CE, has emerged as a potent and dynamic force that benefits children and adults who have difficulties in controlling their movements (motor disorders). The spread of CE throughout the world, has, in large part been due to the determined advocacy of families who have lost confidence in already existing systems of treatment. These families strongly regard CE as a potentially effective response to their needs.(Sutton,1999).

Definition of Cerebral Palsy

In order to understand the nature of Conductive Education, it is important to highlight the different interpretations of cerebral palsy**.**

Throughout decades, the term "cerebral palsy" has been defined in many ways, which is a clear indication of how difficult it has been to precisely designate this condition. The early descriptions left no doubt that it was not a disease, but rather a series of motor disorders (Scherzer, 1982). The traditional medical orientation considers cerebral palsy to be a group of conditions characterized by motor dysfunction and various associated problems which result from non-progressive prenatal, perinatal, or postnatal brain damage (Bax, 1981; Bleck, 1987). Researchers have pointed out how problematic this definition is. Carrasco(1989) maintains that it does not truly reflect the complexity of the condition because it does not relate to the functional effects of cerebral palsy. Hari

and Akos (1988) have suggested that motor disorders should not be considered as simply damage to the function of motor systems themselves, but rather dysfunctions that affect the entire personality's adaptive activities. McDonald (1987) claims that the term "cerebral palsy" is misleading, since damage may occur in areas of the brain outside the cerebrum and that the term "palsy" does not accurately reflect the clinical picture of cerebral palsy. Levitt (1982) adds that since the damage occurs in the developing nervous system, the clinical picture is not a complex of static symptoms. While the damage itself is not progressive, it has various and fluctuating manifestations throughout the maturation of the nervous system, and pathological symptoms which may develop later (Levitt,1982). Cogher (1982), another adherent to this position, contends that defining cerebral palsy as non-progressive brain damage is not only inexact but also misleading. Carrasco (1989), in his attempt to overcome the limitations of existing definitions, suggests combining elements from Bax (1981) and Bobath (1980), and defines cerebral palsy as a movement and stabilization disorder caused by non-progressive prenatal, perinatal, or postnatal brain trauma and is manifested by various muscle coordination and sensory disorders.

Medical model of disability

All of the above interpretations of Cerebral Palsy rely on the medical or psycho-dynamic disease model of a disability. The Medical Dictionary (1990) defines disability as:

> Partial, or total inability to perform a social, occupational or other activity that the affected person wants to do. It reflects the extent to which an individual is disadvantaged by some partial or total disability when compared to those in a peer group who have no such disability. A handicap is usually related to an identifiable structural impairment often based on a range of two standard deviations from the mean observation obtained from studying a large number of apparently healthy subjects. (p. 307)

The medical model regards disability as a pathological condition, with the pathology understood as an objective condition that individuals have. This model is bipolar: One pole is normal (i.e. the absence of pathological symptoms and healthy) and the other pole is abnormal (i.e. the presence of pathological symptoms and illness or "unhealthy") Therefore, "disability" has come to be defined and signified as a power-neutral, objectively observable attribute or characteristic of an "afflicted" person. According to this model, it is the individual who has the problem. In this sense, this model helps guide professionals in deciding the needs of the disabled and prescribe the most appropriate services to help compensate for and treat the symptoms.

Motor Learning Theories Based on the Medical Model of Disability

The medical model as a paradigm has had a significant effect on the treatment of Cerebral Palsy, but also within this model the different theories about motor learning have helped determine the clinical thinking about neuro-motor rehabilitation.

Traditional motor learning theories, such as closed-loop motor control, open-loop motor control and schema-governed motor control theories, can be classified as centralized control theories. Although they are very

different in some aspects, their basic assumption is that a central command center dictates all motor acts with complete detailed specifications. These theories believe that for every motor movement there is a stored "program" much like a computer program. Tucked away somewhere in the brain is an individual program for every motor skill (Kwan, 1993). However, there are three important and closely related problems which cannot be solved by centralized control theories. These are that firstly, the problem of the degrees of freedom: secondly, the flexibility problem: and thirdly, the storage problem. These problems are concerned with the complexity and the unconstrained characteristics of the musculo-skeletal system. The difficulty arises from the fact that the same movement patterns can be performed with different muscle groups and that the movements are never performed in exactly the same way twice. The basic question therefore is, in what ways does the brain know how to control these new movements, and how can a reference of correctness be acquired if no situation ever repeats itself. The idea of a one-to-one mapping between motor programs and performed movements also creates the need for an unrealistically huge storage system to accommodate these programs.

These unsolved problems have led to a shift towards the distributed control system. In such a system, the direction of control is not unidirectional. Lower structures may control higher ones. There are relatively autonomous structures at all levels of the system. It resembles the older Russian concept of the functional system. The action of a functional system is characterized by “the presence of a constant (invariant) task, performed by variable (variative) mechanisms, bringing the process to a constant (invariant) result”(Luria. 1973, p. 28).

Traditional treatment for children with Cerebral Palsy

As result of the medical model of disability, Cerebral Palsy in most countries had been considered as a non progressive chronic motor disorder (Ludwig, 2000) with related syndromes, such as speech language problems, cortical visual impairment and cognitive issues. Therefore the treatment of motor disorders was also medical. The different problems were treated by different professionals from various disciplines, that include special needs teachers, doctors, nurses, psychologists, social workers, speech-language therapists, occupational therapists and physiotherapists. Each professional had a general background in their own discipline. Each professional viewed the child from the aspect of his/her discipline. For instance, physical therapy programs used specific sets of exercises to work toward preventing the weakening or deterioration of muscles that can follow lack of use, disuse and avoiding contractures, in which muscles become fixed in a rigid, abnormal position A widespread program of physical therapy that works toward this goal is the Bobath technique, named for a husband and wife team who pioneered this approach in England. This program is based on the idea that primitive reflexes retained by many children with cerebral palsy present major roadblocks to learning voluntary control. A therapist using the Bobath technique tries to counteract these reflexes by positioning the child in an opposing movement. So, for example, if a child with cerebral palsy normally keeps his arm flexed, the therapist would repeatedly extend it (Hedges,1988).

As the child with cerebral palsy approached school age, the emphasis on therapy shifted away from motor development. Efforts now focused on preparing the child for the classroom. Each area of need within the individual is still treated by specialists who have the particular knowledge and therapeutic 'toolboxes'. Physical therapy prepared the child for the classroom by improving his or her ability to sit or move in a wheelchair. An occupational therapist worked with the child to develop such skills as feeding, dressing, or using the bathroom. For the many children who have difficulty communicating, speech therapy worked to identify specific difficulties and overcome them through a program of exercises. In order to provide this therapeutic intervention the children with different disabilities were enrolled into specialized institutions or schools. The child's day within this system is divided up so that each necessary discipline can be timetabled into his/her program. This results in fragmentation of the child's day. Throughout the child's day many people may instruct, handle, and guide him/her differently. The consistent goals and the practice he/she needs to promote learning are reduced.

In summary, this medically oriented multidisciplinary approach was based on the assumption that the Cerebral Palsied child's communication, academic learning, functional learning and physical training can be dealt with by relevant specialists and in most cases can be implemented in a different environment from which these functions normally occur.

Cerebral Palsy as learning disorder

Conductive Education not only provides a different viewpoint about the nature of Cerebral Palsy but it recommends a different solution as well. The fundamental breakthrough in principle provided by Peto was his view that motor disorders should be perceived as **learning problems** (Hari and Tillemans, 1984). Petö argued that even though the primary problem of the child with Cerebral Palsy is physical, their inability to function could be attributed, first of all, to a psychological problem, i.e., to a learning difficulty that develops on a secondary level. While the original brain damage may be non progressive, its effect upon all areas of development may be constantly changing and can result in, as Peto stated, a generalized **dysfunction**. Peto considered that a motor disordered child, after brain injury, is still actively attempting to solve problems arising from tasks in the environment. At the physical level, it is found that the loss of certain neural tissues does not limit the attempt of the remaining tissues to compensate for the loss.

Experimentation in support of this idea includes Taub's study (1980) on the deafferentation of a limb in monkeys which started to use the deafferented limb again for functional activities once his intact limb was restrained. This illustrates that nonuse of the limb does not occur because of the neural deficit but rather because of a learned compensation for the deficit (Tsang,1990).The above can account for the exhibition of various nonfunctional and stereotyped motor patterns in a child with a motor disorder. Peto did not regard dysfunction as a feature of such children, but the product of the interaction between the child and his environment (Hari and Tillemans, 1984). Peto claimed that dysfunction is a change in coordination, which can be viewed separately from any deficiency. Peto asserted that dysfunction is not **static** or **localized** and it affects the whole personality of the child with cerebral palsy. He was not concerned about the injury of the central

nervous system. His concerns and interest were to alter the integrating function of the nervous system responsible for the organization of a wide variety of functions and which, due to the injury, had become disintegrated.

The dysfunction of the child is not the maladaptive movement pattern itself, but, as Peto stated the result of an interrupted learning process. The difficulties inherent in adapting to the requirements of an activity leave the child unmotivated to continue the problem-solving skill process. The child then learns to be dependent. One can see that the effect of a lack of motivation is not limited to the physical level, but extends to the psychosocial level, impeding the child's development as a whole (Kwan 1990). In other words, as individuals, we face greater and greater challenges that require more and more skills. Motor disorder can have a devastating effect upon the ability to meet these challenges and to learn the necessary skills. Peto considered dysfunction as a certain organizational characteristic of an individual. It is not a well defined malfunction or symptom or condition. It's manifestation is that the individual wants or should do something but he is unable to do it, not because he is incapable of doing it but because he does not know how to do it (Hari, 1990).

Therefore Peto, argued, while the origin of Cerebral Palsy is medical, the consequences interrupt the general learning ability of the individual. Peto instead of thinking in therapy and adaptation, suggested that by applying an appropriate educational approach the individual could learn to overcome the consequences of the motor disorder.

The ultimate goal and key principles of Conductive Education

Based on his concept about dysfunction, Peto's, ultimate goal and major rehabilitative objective was to restore the interrupted learning process using a holistic **educational** approach while integrating the individual into the educational setting or society where he or she belongs. Peto's system is based on the notion that education should not distinguish between the learning mechanism, the neuro-physiological basis of motivation, or the regularity of the learning process. Rather, education is concerned with the conditions that enable the objectives of teaching, education and rehabilitation to be successfully attained (Hari, 1975). Therefore children with Cerebral Palsy must actively and consciously learn every skill, including motor, cognitive, self-help and social skills that are spontaneously learned by typically developing children through maturation and stimulation.

This can be done under two conditions:

1. By presenting **functional tasks**, which involve real, concrete demands and require the brain to find solutions.

2. By presenting **environmental and psychological conditions** conducive to this learning process This means that through meaningful activities the child will learn new ways of approaching challenges s/he face in everyday life.

Key principles of CE

A)The child is a unified whole.

The detrimental effects of a brain injury impede the whole development of the child, therefore a successful treatment is one that considers the individual as a **unified whole** and provides an overall, holistic intervention. Holistic means that everything in life, the total functioning of the individual, personal development and social organization, is seen as interdependent, interconnected, multi- leveled, interacting and cohesive (Tatlow, 1988). This idea of "whole" underpins the system from which Peto thought that children with motor disorders would benefit.

B) CE targets the whole personality

As Allport (l961) defined "Personality is the dynamic organization within the individual of those psycho-physical systems that determine his characteristic and behavior and thought." In this definition the word 'organization is important. It means that the personality is not just a sum of traits; one added to another, but rather that the different traits are held together in a special relationship to the whole. 'Dynamic' indicates the constantly evolving and changing nature of the individual's personality. From time to time and from one situation to another, there are changes in the structural organization which are influenced by the concept of self (Hurlock, 1974).

In CE the impaired children's personalities are built up in a gradual and age appropriate way.

In Peto's system, the individual is not a recipient of treatment, s/he is an **active participant** in the learning process. CE is a partnership between educator and learners to create circumstances for learning- it is an all day learning process (Sutton, 1993).

C) Activity and intention.

Peto stated that restoring the interrupted learning process is not possible without the **active participation** of the individual. Passive exercises or patterns cannot change or improve the functional stage of the individual.

D) Continuity and consistency

Continuity is necessary to reinforce a new skill. An opportunity to use the same skill for many different tasks is also essential. The system has to provide possibilities for children to practice emerging skills not only in specific learning situations but in the many inter-connecting, in-between situations of which life consists. In order to achieve this, CE turns any given part of a child's day into a learning situation.

E) CE is an interdisciplinary model.

Peto believed that in order to provide a unified treatment it is vital that the group of professionals who are responsible for the program have training based on the same philosophy and relevant practice.

Instead of a multidisciplinary approach, Peto applied an **interdisciplinary model** where a single specially trained group of professionals are responsible for the planning and implementation of the whole process.

Theoretical supports of Conductive Education

Peto began constructing his system in the 1920's and further developed it from 1945-1967. The neuro-physiology, the neuro and educational psychology of his time could not provide him with an adequate theoretical background to support his work. He used his empirical experience as a guideline for his practice. Although it is 'atheoratical' to begin a practice without a theoretical background, later development in basic scientific studies may result in theories that support the practice (Kwan, 1993).

The following theories can be used as a support for Peto's system.

Neuro-physiological basis of CE

As a neuro-physiological basis of his theory, Peto, among others, hypothesized that even a damaged central nervous system has a huge amount of residual capacity, which with appropriate teaching, can overcome the functional difficulties resulting from damage or injury.

With modern medical imaging technology, the cell structure of the central nervous system became observable. It has been proven that the neurons in the brain are organized into very complex circuits and pathways giving an unimaginable number of possible results. In line with this, the concept of "neural plasticity" has been gaining increasing significance. Learning is believed to take place, as seen from a neurophysiological aspect through neural transmission of some of these highly complex circuits and pathways. They are being recognized as the neurological substrates of various behavior systems. These systems interact and produce certain fundamental "conditions" which include: 1) A state of arousal or attentiveness 2) A system that encompasses goal-orientation and its consequences such as "reward" mechanism 3) Memory. An immense variety of learning outcomes are possible due to the manner of interaction of these circuitry systems, which have overlapping neuronal pathways.

Neural plasticity is the ability of neurons to modify their original function, for example, the ability of unaffected neurons to take over some of the functions of those neurons that have become dysfunctional. How is this possible? This is due to the richness and flexibility of the connections of neurons, that is, the synapses and the ability to form functional contacts resulting from experience and frequent association of particular afferents. It is essential to facilitate this process with appropriate stimuli. (Re)establishing dormant synapses and axonal sprouting belong to the neurophysiological phenomena that promotes neural plasticity. The phenomena underlying neural plasticity therefore modifies what was previously undisputed, namely, that once brain neurons concerned with a certain function are damaged, that function is permanently lost. Also, it is generally accepted that the average person only uses a fraction of his/her billions of brain neurons. In Conductive Education, the person's neural plasticity is explored, so that the person can learn in his or her own best way (Hamori, 1997).

Modern motor learning theories

Current motor learning theories show an increase in emphasis on the importance of studying totally meaningful goal-directed actions instead of isolated simple movements (Mulder & Hulstyn, 1984).

Gentile (1987) stated that the first stage in any skill acquisition is the formulation of the goal. In motor learning, much emphasis is placed on making the goal clear for the learner. Research shows that individuals improve their motor skills through the use of programmed movements only after they have completely understood the behavioral goal for which the movements are to be used (Brooks, 1986). Emphasis on intention in motor learning is also based on the theoretical concept of the operation of the central nervous system in motor activities. In the distributed control model the main responsibility of the executive system is the regulation of the interactions between the relatively autonomous lower structures, so that they can be integrated into a combined pattern of goal-directed activity (Mudler & Hulstyn, 1984). It implies that the lower structures control movement, whereas the executive system controls action. If this is true, then lesions of the central nervous system disturb the action system, but not the movement system. It means that the main task of intervention should be to rebuild the action plan or the intention (Kwan, 1993).

Limbic system action on motor learning

Brooks (1986) stated that "the drive and its reduction are necessary conditions for motor learning". The neuro-physiological basis of such a statement lies in the action of the limbic system on the sensory-motor system. The limbic system governs basic biological drives and emotional behavior. It also generates emotional motivation, the need for action. It influences and is influenced by the sensory-motor, non-limbic part of the brain (Brooks, 1986). Therefore, when we arouse the child' s interest and emotion, we appeal to his limbic system, which in turn enhances the non-limbic sensory-motor system. The role of motivation in motor learning is firmly upheld in Conductive Education. Hari (1975) asserted that learning can only take place with adequate motivation. Moreover, "the goal must have a more emotional character ... Our feelings and our interests inspire what we do" (Hari, 1988). In Conductive Education, the conductor seeks to motivate the children in a variety of creative ways. She uses all her talent, humor and imagination to create an atmosphere of action and interest. Often, stories with strong emotive elements involving dolls and animals are used to provoke adequate emotional energy for the child to act.

The role of active learning

According to modern motor learning theories, only active trials can improve performance, lead to adaptation, and result in motor learning. In contrast, passive postures and movements imposed on the subject without active follow-up, are of no practical value (Brooks, 1986). The neural basis for this comes from the manner in which the cerebellum and the basal ganglia operate while continuously comparing the requirement of the original intention and the cortical output that comes from active participation in movement. Without active movement, this cortical output copy is not available for comparison and hence will not result in adjustment or motor learning. The idea of **active learning** is so prominent in Conductive Education that it distinguishes this approach from others. In Conductive Education, the child is always active. The conductors facilitate by providing the appropriate problem and the environment conducive to solving it. It is always the child who

constructs his own answer. Instead of being passively moved, the child says for example, “I grasp the table”. This continuous verbalizing of an active sense of movement induces a sense of responsibility, as well as dignity in the child. Hari (1988) emphasized that “The conductor must allow someone to reach his goal without helping him directly, at the same time keeping the link with the person active while not interfering directly with the function which should be modified. This is an important aspect of human dignity and human personal freedom”. This belief in active participation in Conductive Education started from a psychological perspective. It meets with motor learning theories that study the same subject from a neuro-physiological viewpoint. After all, didn’t our common sense tell us just this before all these theories and approaches were invented? In Conductive Education, every effort is made to instill success in the client. "The targets set must be realistic, biological-social requirements. Their accomplishment must be intended by the individual, while the pedagogue (conductor) will have to create all the conditions under which the individual can successfully achieve the target he is to reach” (Hari, 1975).

Vygotsky’s Social Development Theory

Vygotsky’s Social Development Theory also provides a strong theoretical support for Peto’s system.

Lev Semenovich Vygotsky (1896-1934), a Russian literature teacher and psychologist, started working in the areas of developmental psychology, education and psychopathology in 1924 (Murray, 1993).

The major theme of Vygotsky's theoretical framework is that social interaction plays a fundamental role in the development of cognition. Vygotsky (1978) states:

> Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals. (p57).

The other determinative concept in his theory is The Zone of Proximal Development (ZPD). The ZPD is the distance between the actual developmental level as determined by independent problem solving and the level of potential as determined through problem solving under adult guidance or in collaboration with more capable peers. A child's actual developmental level indicates a child's level of mental development at a particular time. It indicates the functions that have already matured in the child. A child's ZPD defines those functions that have not matured yet, but that are in the process of maturing and developing. A child's ZPD permits us to outline the child's immediate future and his overall dynamic state of development (Hanfmann, 1962).

Vygotsky emphasized the central role of language in the development of self- regulation. Self-regulation represents the transformation of basic biologically determined processes into higher psychological functional processes such as volitional attention, memory and problem solving (Vygotsky, 1981). In the transformation, the child becomes less bound to and less controlled by the concrete, immediate environmental stimuli but demonstrates the increasing role of self formulated plans and goals in the regulation of behavior. The regulation of behavior begins as a social process and is seen to rely on the mediation with an auxiliary sign of shared meaning between the adult-child dyad within their socio-cultural orientation. The sign serves to “break up the

fusion of the sensory field and the motor system and thus makes new kinds of behavior possible." (Vygotsky, 1978.*)*.

Vygotsky formulated the developmental progression in the use of speech in this respect in three specific stages. First, the caregivers bring in speech and use it to help the child focus his or her attention on salient aspects of the physical, social environment. In this stage, the child is not able to use speech all by him/herself but there is a close co-operation between the child and the adult though the child's behavior is basically regulated by the adults' speech. Later, the child initiates his or her own speech to describe his or her ongoing activities. To differentiate speech from the communicative purpose, such speech-to the self is coined private speech. In this stage, private speech accompanies the child's activity. There is interplay between the child's private speech and the adult's guiding speech in regulating the child's behavior. It is noticed that very often the child's private speech mirrors the adult's guiding speech. The adult's speech augments the child's private speech.

Gradually private speech undergoes structural and temporal changes. It precedes the child's action and is not merely a description of the situation. It is more orienting, planning and guiding in nature. At this stage, private speech does not simply mirror adult's speech. It represents the child's verbal thoughts and arrives at the self regulatory function. Finally, private speech becomes inaudible utterances and "goes underground" as internal thought processes (Vygotsky, 1962). These internalized utterances would appear again as overt speech for problem-solving processes in situations of challenge.

The above concepts can provide a theoretical background for the interpretation of the elements of Conductive Education.

References and recommended reading list

Akos, K. Akos, M.(1991). Dina. A mother practices Conductive Education. Birmingham and Lm,

Allport, G.W. (1961). Pattern and Growth in Personality. New York: Holt, Rinehart and Winston.

Bairstow, P Cochrane, R (1993) Is Conductive Education Transplantable? British Journal of Special Education. 20 (3) 84-88.

Bax, M. (1981). Management of Cerebral Palsy. Developmental Medicine and Child Neurology, 23, 703.

Bleck, E.E. (1987). Orthopedic Management in Cerebral Palsy. London: Lavenham Press

Bobath, K. (1980). A Neurophysiological Basis for the Treatment of Cerebral Palsy.

Philadelphia: JB Lippincott Co.

Bochner S, Center Y, Chapparo C, Donelly, M. (1996) Implementing conductive education in Australia: question of programme transplantation. Educational Psychology 16. 81-92

Brooks, V.B. (1986). The Neural Basis of Motor Control. New York: Oxford University Press

Case-Smith I. (1991). The Family Perspective. In W Dunn. (Ed.), Pediatric Service Delivery: Facilitating Effective Service Delivery. (319-332). Thorofare, N.J. Slack

Carrasco, R.C. (1989). Children with cerebral Palsy. In: P.N. Pratt and A.S. Allen (1985). Occupational Therapy of Children. St. Louis: Mosby

Clark-Wilson, J., and Gent, A. (1989). Conductive education approach to individuals with motor disorders. British Journal of Occupational Therapy, 52(7), 271-272.

Cogher, L. Savage, E., and Smith, M.S.(1992). Cerebral Palsy, the Child and the Young Person. London: Chapman and Hall.

Concise Medical Dictionary. (1990). Oxford , New York : Oxford University Press

Cole, M, John-Steiner, V, Scriber, S. & Souberman, E, ed. & Vygotsky, L.S. (1978). Mind in Society: the development of higher psychological processes. Cambridge, MA: Harvard University Press

Cottam, P.J. and Sutton, A (1986) Conductive Education : A System for Overcoming Motor Disorder. London: Croom-Helm

Cotton, E.(1965). The institute for movement therapy and school for “conductors”, Budapest, Hungary. Developmental Medicine and Child Neurology 70(4), 437-446

Forrai, J. (1999) Memoirs of The Beginnings of Conductive Pedagogy and Andras Peto. pp. 21-75. Budapest, Birmingham: Foundation of Conductive Education, Uj Aranyhid

Gentile, A. M. (1987). Skill Acquisition : Action, Movement, and Neuromotor Processes. In: J.H. Carr & R.B. Shepherd (Eds.), Movement Science: Foundations for Physical Therapy in Rehabilitation.93 –154. Rockville, MD: Aspen Publishers.

Hanfmann, E., Vakar, G. & Vygotsky, L.S. (1962). Thought and Language. Cambridge, MA: MIT Press.

Hamori, J. (1997). Neuronal Plasticity as the neurobiological basis of the conductive education. Conductive Education Occasional Papers No. 1. 21-37. Straffordshire: Trentham Books Ltd.

Hari, M. (1975). The Idea of Learning in Conductive Pedagogy. In: Akos, K. (Ed.), Scientific Studies on Conductive Pedagogy. Budapest : Conductors’ College,

Hari, M. Tillemans, T. (1984). Conductive Education Booklet. pp.19-124. Budapest,

Hari, M. Akos, K. (1988). Conductive Education. London: Routledge

Hari, M. (1988). The Human Principle in Conductive Education. Reprinted in “The 1988 Budapest Report by the Hong Kong Delegates” (1990). Tatlow, A. (Ed.). Hong Kong Conductive Education Project Team, Joint Council for the Physically and Mentally Disabled (Rehabilitation Division, Hong Kong Council of Social Service).

Hari, M. (1990) Conductive Education. Budapest: MPANNI,

Hari, M. (2001) The History of Conductive Pedagogy. Conductive Education Occasional Papers, Supplement 2. Budapest: International Peto Institute.

Hedges, K. (1988). The Bobath and Conductive Education Approaches to Cerebral Palsy

Treatment-Management and Education Models. New Zealand Journal of Physiotherapy. pp.6-12

Hevey, D. (1992). The Creatures Time Forgot London, Routledge

Horvath, J. (1997) Andras Peto – a brief biographical sketch. Conductive Education Occasional Papers. Straffordshire :Trentham Books Limited.

Hungarian Gazette (1963) The Hungarian Workers' and Peasants' Government Decree 21.12.1963/36

Hurlock, E.B. (1974). Personality Development. New Delhi: Tata McGraw-Hill.

Kozma, I. Balogh, M. (1995). A brief introduction to conductive education and its application at an early age. Infants and Young Children 8(1), 68-74.

Kozma, I. (1995). The basic principles and the present practice of conductive education. European Journal of Special Needs Education. 10 No. 2, p.115.

Kozma, I, Horvath, J. (1997). Past Present and Future of Conductor Training. Conductive Education Occasional Papers. No.4&5, 39-45.

Kozma, I. Balogh, E. (2001). Conductive Education (CE) in intervals. Conductive Education Occasional Papers. No.7, 9-25.

Kwan, W. W. (1993). Motor Learning Theories Related To Conductive Education. In: Tatlow, A. (1993). The Hong Kong Conductive Education Source Book. Hong Kong: Hong Kong Council of Social Service

Kwan, C. (2001). The social origin of using speech for self-regulation of motor acts in Conductive Education. Conductive Education Occasional Papers. No.7, 89-99.

Laurent, M. Sagot, J. Saumoni, N. Toualy, E. (1999) La mèthode d'èducation conductive Petö en Hongrie, Rubrique Internationale. 5 (1) pp. 146-153 English translation available: http://www.conductive-education.org.uk/html/news/frenchrep.html

Levitt, S. (1982). Treatment of Cerebral Palsy and Motor Delay. Oxford: Alden Press.

Lion, A. (1989). First Draft of a Plan on the Relative Status of the Peto System in Israel. Unpublished manuscript

Liberty, K. and others (1991). Evaluation of Conductive Education for children with motor disabilities: first result from the Dunedin Programme. Unpublished report,

Ludwig, S, Leggett, P. Harstall, C. (2000). Conductive education for children with cerebral palsy. Edmonton, Alberta: Alberta Heritage Foundation for Medical Research,

Luria, A. R. (1973). The Working Brain : An Introduction to Neuropsychology. New York: Penguin Books.

MacDonald, E. T. (1987). Treating Cerebral Palsy. USA: Pro-ED

MacKay, G. (1995). Some problems with the translation: conductive pedagogy in the context of comparative education. European Journal of Special Needs Education. 10. No.2

Mulder, T. & Hulstyn, W. (1984) Sensory Feedback Therapy and Theoretical Knowledge of Motor Control and Learning. American Journal of Physical Medicine, 63 (3), 226-224.

Murray Thomas, R. (1993). Comparing Theories of Child Development. Third Edition. Belmont, California :Wadsworth Publishing Company

Morris, J. (1991). Pride Against Prejudice. London, Women's Press.

Oliver, M. (1989). Conductive education: if it wasn't so sad it would be funny, Disability Handicap and Society. 4. 197-200.

Oliver, M. (1990). The Politics of Disablement London: Macmillan

Oliver, M. (1992). The Social Construction of Disability. COHERE Conference, Glasgow

Oliver, M. (1996). Understanding Disability. London: Macmillan

Orfalvy, A. 1997). The development of conductive education network in Hungary. Conductive Education Occasional Papers. No.2, 79-84

Pedersen, A.V. (2000) Conductive Education – A Critical Appraisal. Advances in Physiotherapy. 2, 75-82.

Read, J. (1998) Conductive Education and the Politics of Disablement. Disability & Society. 13, No. 2, 279-293.

Schenker, R. (1997). An intervention model for parents and children (ages 0-3} with motor disorders based on the Tsad Kadima system (Peto method). Conductive Education Occasional Papers. No.2, 71-89.

Scherzer, A.L., and Tschauner, I. (1982). Early Diagnosis and Therapy in Cerebral Palsy. New York: Marcel Dekker

Sutton, A. (1993) Ed. Conductive movement therapy as special education. By Peto, A.

The Conductor. No.18, p. 37

Sutton, A. (1998) Conductive Education for adults and children with motor disorders. Home Economist, 17, (3) 18-19.

Sutton, A. (1998). Conductive Education As Exemplar Of The Emerging Paradiam Of Dynamic Inclusion, With New Emphases For Educational Research. Paper Presented at the European Conference on Educational Research Ljubljana, Slovenia

Sutton, A (1999) Towards Conductive Education. In Forrai, J. Memoirs of Beginnings of Conductive Pedagogy, Andras Peto. Budapest, Birmingham: Uj Aranyhid, Foundation of Conductive Education,

Tatlow, A. (1980). Towards a Comprehensive Motor Education in the Treatment of Cerebral Palsy. Physiotherapy.

Taub, E. (1980). Somatosensory deafferentation research with monkeys: Implications for rehabilitations for rehabilitation medicine. In Ince, L. P. (Ed.). Behavioral Psychology in Rehabilitation Medicine: Clinical Implications (pp. 371-401). Baltimore: Williams & Wilkins

Tsang, K. L. (1990). Discussion on applying Conductive Education to the Context of Hong Kong. Part I: An Analysis of the System of Learning. In Talow, A. and Wong, A. (Eds.), Conductive Education in Hong Kong No. 4.

Vygotsky, L. (1978). Mind in Society: The Development of Higher Psychological Processes. Cambridge, MA: Harvard University Press.

Vygotsky, L.S. (1982). Vosprijatie i ego razvitije v detskom vozraste. In Vygotsky, L.S. Collected works. In 6 volumes. Vol.2, 363-81. Moscow: Pedagogica.

Wagner, G. A. (1994) Conductive Education, Feasibility Study on Developing a National Curriculum Plan for Those working in Conductive Education in New Zealand

New Zealand Council for Educational Research, Wellington, pp. 13-107.

Zsargo, L. Coles, C. (1998). Conductive education: towards an 'educational model.' British Journal of Special Education. 25. No.2, 70-74.