

The Activity Nervous Superior and the Employment of the TIC in the Free Shot of the Basketball



Regla Caridad Hernández Buides^{1*}, Rebeca Núñez Rondón² and Nelsón Guzmán Azcano³

¹Department of Sport Balls, University of Sciences of the Physical Culture and the Sport (UCCFD) Havana, Cuba

²Department of Applied Sciences, University of Sciences of the Physical Culture and the Sport (UCCFD) Havana, Cuba

³Department of Basic Sciences, University of Sciences of the Physical Culture and the Sport (UCCFD) Havana, Cuba

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***Corresponding author:** Regla Caridad Hernández Buides, Department of Sport Balls, University of Sciences of the Physical Culture and the Sport (UCCFD) Havana, Cuba

Abstract

In the ages of sports initiation, the correct learning of the technique and the improvement of the multilateral physical condition can be achieved on the basis of the varied use of all means of physical activity using the most appropriate organizational methods, means and procedures and Information and Communication Technologies (ICT). In this, the close relationship with Basic and Applied Sciences, especially with Computer Science, Physiology and within it Neurophysiology as a determining science of the participation of the Osteomyoarticular System (SOMA), the energy contribution, the integration of the physiological systems, the cognitive processes and the metrology that determine the quality of the action which must be accompanied by variants similar to the dynamics of the game passing through each one of the phases of the motor habit. Information and communication technology has a great influence on the theory and practice of sports training and on the direction of its different processes, starting from the basic elements of sports technique with novel methods and forms such as movement analysis software human, videography techniques that encourage the motivation and creativity of future graduates and sports professionals.

This work aims to assess the importance of Higher Nervous Activity and the use of ICT in learning the technique of free shot in Basketball, taking into account the cognitive processes in sports initiation, their development depending on maturation and myelination of the nervous system as responsible for accelerating the transmission of nerve impulses. In the work that is presented, an analysis was carried out where the empirical and theoretical methods, with the use of ICT, allowed modeling the object of study with a perspective that has not been valued by the coaches with the necessary magnitude, which implies, new relationships that must be addressed due to their complexity and supported by a new theoretical-methodological dimension.

Introduction

The teaching of Sports Motor Skills (HDM) with the use of Information and Communication Technologies (ICT), is focused on achieving the correct assimilation of the technique in order to achieve the bases for its future development and consolidation. In the adaptive evolutionary process of the human species for thousands of years that has enabled the development of the modern brain, physical activity has played a leading role. Exploring and knowing the environment that would guarantee the survival of the human being required a direct integration between motor operations and cognitive abilities. That is the reason why the hippocampus, essential for explicit memory and learning, is one of the brain regions most influenced by physical exercise.

In addition, the development of other regions that guarantee energy efficiency, such as the hypothalamus, surely facilitated the appearance of greater capacities, both cognitive and motor.

During the practice of the technical elements a state of predisposition and development for physical activity is created. There are many factors that prevent this teaching-learning process from marching with the required level, affecting the expected results in the first pedagogical level of teaching where the general objective is to achieve multilateral physical development, adapting general motor skills to the specific motor skills of the sport. . Now, in the teaching of technical elements, according to what is proposed by authors such as Hernández and Monteagudo [1] and

Argudín [2], the means and procedures for the development of the basic primary elements define the success of the action where it is maintained the balance between the elements contained with the initial phase of the action such as the placement of the legs, the position of the trunk, head and arms, etc. that are fundamental, which implies a series of modifications in the stage of motor learning in the area of the Central Nervous System (CNS) that generally cannot be observed but, as proposed by the Group on Training (G-SE), can be induced by means of changes in performance in cognitive and motor aspects. In the analysis of the Comprehensive Athlete Preparation Programs (PIPD), guiding the teaching programs, the lack of attention to physiological aspects was evident, hence the importance of highlighting the study of the behavior of higher nervous activity in sport.

The Nervous System and the Correct Automation of the Technique with the Use of ICT

The complexity of integrating the body's control systems directed by the CNS to arrive at the correct automation of the technique and obtain positive results is one of the great challenges for coaches in initiation. Therefore, it is proposed that the occurrence is given in the mechanisms that must be established to adapt the reference point where the correction of the confrontation between the expected result and the real result must go, in addition the authors defend the aforementioned postulates and share the same opinion of what was raised by Mora [3] who refers that motor learning manifests gradually with the progressive passage from the initial phase of understanding the task and clumsy coordination to a final phase of deep understanding and automation of movement. In the study of the preparatory phase of the HMD, as a simplified structure of the action, the bases are created to correctly execute the most complex actions with "greater security" in the execution and culmination phase. In line with technological development, one of the main features is the scientific, technological and humanistic character, both in its conception and in its performance, with the use of ICT, creating new technological scenarios that transform substantive processes with the wide use of the technology. ICTs are the set of computer resources that facilitate learning and its development, as well as the development of skills of athletes. They are very valuable tools to improve your techniques and your performance.

The use of new devices (mobile phones, digital tablets, laptop) with new possibilities (internet, GPS, greater autonomy) enables a greater range of applications on these devices such as programs, videos, social networks, etc. causing a higher demand, the possibility of its employment anywhere and its increasingly massive possibility of employment by a greater number of people, allows the greater transmission of information and reception. Despite the advantageous possibilities, its use is not always possible due to the non-existence of technology for the development of the physical education subject or sport, lack of

preparation of teachers, fear of its use instead of practical activity or that is not taken into account in the didactic development of the subject.

To achieve the correct teaching of sports technical elements in children of sports initiation age, the teacher must have a proper preparation regarding the biological development of children for the rational organization of sport, taking into account the degree of evolution of their functional capacities, which can be achieved with the use of programs that collect the necessary information, its processing and the analysis of its results.

The teacher must know the physiological characteristics of age based on the behavior of the heart and respiratory rate, lung function and therefore the behavior of volumes and capacities, all due to the poor development of organ systems. It is necessary to know that the nervous system of these children does not have a full maturation due to the poor development of myelin, a lipoprotein material responsible for accelerating the transmission of nerve impulses. All this knowledge will allow to analyze in greater depth the teaching process and the influence that higher nervous activity has on it, through the participation of the different nervous centers and their influence on motor control. The nerve centers participate in the control of the different stages of movement related to each other in a direct or indirect way and that influence the spinal cord and the brainstem to execute the movement.

According to Córdova [4], three different structures intervene in the development of the functions of the nervous system (SN): the sensory system, the integrative system and the motor system. The sensory system captures the information of the motor learning activities that are carried out at all times in the organism itself (position of the limbs, of the head, etc.), or that obtained from the body surface (touch, vision, ear, etc.). The data collected at this level is sent to the integrating system that analyzes the received stimuli and decides the necessary modifications that are transmitted to the effector organs through the motor system, which is the final transmission route of the nervous system. The signals captured by specialized sensory receptors are directed to specific areas of the central nervous system (CNS), medulla, brain stem, subcortical regions or cerebral cortex, where once analyzed, they are sent to storage areas, or responses are elaborated motor, the more complex the greater the information processed by the integrating system.

In order to carry out any movement, however simple it may be, the interaction of various structures of the motor nervous system is required. These structures are hierarchically organized so that orders go from a higher level to a lower level obviously, taking into account the cooperation between the different control centers, so that the effectiveness in the execution of the orders is optimal. If we take into account the function of each nervous center that intervenes in motor control and, starting from the lower hierarchy

of these, we can see that the spinal cord, in addition to being the channel through which all afferent and efferent signals travel, controls reflex movements independently of higher-level centers, Guyton [5] although these levels modulate automatic motor acts known as involuntary reflexes.

In ascending order we find the brain stem that controls respiration, cardiovascular function, blood pressure, which at these ages are still a bit high due to the immaturity of these systems, the support of the body against gravity and a large part of the stereotyped movements of the body. The limbic system is responsible for controlling emotional behavior, including defence and thermoregulatory behavior. These behaviors involve the coordinated manifestation of different neurovegetative, neuroendocrine, somatic and motivational mechanisms Quintanar [6].

The basal ganglia participate in the control of motor activity through modulating effects. They do not participate directly in the execution of the movements, but rather in their control and play a key role in converting the motor programs for the preparation of the movement into execution programs, Córdova [4]. The author also states that the cerebellum is also called the "silent area of the brain" because the excitation of its structure does not cause any sensation or motor movements, but it is especially important in the control of fast activities. Regulates balance, adequacy of posture and coordinated development of movement. It represents a complicated feedback mechanism, beginning and ending in the motor cortex.

The most important acquired determinant to modify human behavior is learning, and the consequence of its persistence or memory. These processes are more persistent the earlier in life they are acquired. Memory implies the registration, fixation and consolidation of learned behaviors according to Quintanar [6]. Everything we learn in life is stored in the higher hierarchy level of our SN, the cerebral cortex, it is it that performs two main tasks in the initiation of movement, on the one hand it "translates" a thought into motor language and on the other hand "Elaborates" a global spacial-temporal scheme of the projected action. This means that all the HMD that our children learn in the initiation ages will be stored at this level for life and as their repetitions increase, the movement patterns will be perfected by virtue of creating future sports techniques.

The cerebellum and the basal ganglia are decisive in the learning and perfection of the execution by the motor system due to their perfect synchrony and the feedback mechanism to the cerebral cortex. Through this mechanism, the cerebellum compares the intentions of the cortex with the performance of body parts. In the event that it does not correspond to those, it calculates the error between the two and immediately carries out the pertinent corrections that are executed by the cortex itself.

All these parts of the CNS are integrated as a whole to put the endocrine system into action as the other control system that will guarantee the energy supply to the body to allow the performance of this practice through the production of hormones, which in this period They are produced in considerable quantities, especially those that are controlled by the sympathetic vegetative nervous system and that are neurotransmitters, as suggested by Orbeli & Wilmore [7].

The hypothalamus, despite being a structure of the NS, is an integrating center of responses both vegetative (blood pressure, RR, HR and thermoregulation fundamentally) and endocrine (production of hormones that guarantee the control of energy and electrolytes fundamentally) and establishes its relationship with the Hypophysis, gland of the endocrine system (SE) through the pituitary stalk. In this way, both systems set the body in motion, guaranteeing adequate learning and performance of sports motor skills.

The Employment of the ICT in the Free Shot of the Basketball

The access and use of the new technologies provide the conditions for the development and improvement of the sport Techniques. In the study carried out by Hernández & Montegudo [1] and Núñez et al. [8] to the, for the analysis of the technical execution of the free shot in Basketball gets rid they kept in mind the pedagogic level of the investigation groups to determine the level acquired in dependence of each one of the phases of the habit motor and the indicators that characterize it. The procedures to capture the video images in each one of the studies were the following ones.

- a. A semi-professional digital video camera was used, with a filming speed of 60 frames per second.
- b. The software was used to capture and select the motion clip and the analysis will be carried out with the Human Movement analysis software (Kinovea)
- c. The camera was first placed on the lateral line to the 4 m free shot line and in a second moment on the baseline of the ring used.
- d. The height of the basket at 2.60m Mini
- e. Basketball balls
- f. The digitization of the files will be stored in 2GB RAM installed memory with a 32-bit operating system.

The mensurations of the technique and the Biomechanist aspects in each one of the phases of the free shot (Initial, of execution and culmination) can be carried out the players during the competitive activity or in the different test designed with free shots includes in the Plan of training or teaching Program. For each one of the studies a work model was selected, which

was inserted in the library of the Human Movement Analysis software (HUMAN) and the coordinates of the points of the anatomy of the investigated contemplated in the model were taken. This measurement can also be done in normal preparation

and competition game situations. The description of the evaluated pattern of the free shot technique execution in the initial, execution or final phase can be given in angles (Figure 1).

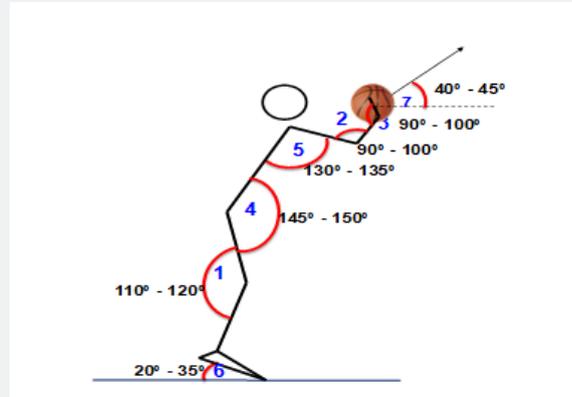


Figure 1: The use of ICT in the graphic representation of the technical gesture.

Diagram I the Use of ICT in the Graphic Representation of the Technical Gesture

Source: Sports technique posture, Pérez [9] ICT

The coordinates of the points anatomical, space or the time investigated fellows and the selection of appropriate models for

the analysis of the execution of the free shot in children and youths in Cuba have been good as reference for future investigations in the Cuban Basketball (Table 1) were. It has been made a pursuit to determine the main deficiencies that impact negatively during the teaching process and consolidation of the sport technique (Table 2).



Figure 2: Use of technology for the evaluation of the technique of Free shoots in Basketball in the teaching process.

References data: the thesis of master of sport training, Hernández [1]

The inform about the Technical Scientific Service lent by the Department of Applied Sciences of the UCCFD to the infantile

Basketball during the Latin American event had the participation of the teams: Puerto Rico, Criollos, Capitalinos and Metropolitanos. They were carried out filming with a camera of 30 c/s to 22 athletes in a perpendicular plane to the action of free shot, to analyze the

technical execution by means of 8 indicative Biomechanist (the first ones three for the initial phase and the remaining ones in the culmination phase) measured with the system of movement analysis KINOVEA. The filmed athletes were analyzed in groups of 5 and 6 players, contained in a size standardization and corporal weight, keeping in mind the longitude of the extremities (Figure 2).

Source: Biomechanist Study of the execution of the free shot, Hernández and Monteagudo [1]

The use of ICT depending on the development of the athlete's training has a high degree of interaction in sports results. Information and communication techniques have been gaining importance in the field of Sports; they are essential tools within the entire system. The utilities of programs, software, applications with the particularities necessary to improve the performances of athletes are one of the great disputes in the scientific panorama of sport. Their effectiveness guarantees correcting early deficiencies and their subsequent correction as soon as possible. Human movement analyzes detect weak points in real time from the data entered into the system, facilitating systematic control in the technical and physiological planning of training in individual and collective modalities. The various applications facilitate the design of evaluations of sports qualities for their analysis and interpretation, allowing the printing of reports, tables and graphs, image galleries with the evolution of performance; they are undoubtedly useful tools that every day the daily work becomes more precise in determining the projects and lines of work in each of the components of the preparation.

Through the guidelines of the training classes as a motivational and necessary vehicle in the integral formation that allows the harmonious passage in the sport discipline, the child must learn while having fun according to the PIPD (2017 - 2020). The authors of this work consider that one way to achieve this is through educational games or the use of computer media. The guiding document also guides that there must be collaboration and rivalry between the practitioners, so that the process occurs more efficiently and the support of colleagues causes a successful help both in the individual or team strategy. In the same way, teaching should correspond where everyone must learn and achieve the best possible domain. At these ages, children must learn the different rules through play and with the correct use of sports technique, so that all will receive the same time for the development of skills in correspondence with the volumes and intensities according to the methodological indications of each one of the Teaching Programs. In the theoretical preparation, an evaluation system must be established by means of tests that verify the contents taught and in a particular way the essential technical, tactical or cognitive aspects that are related to the planned contents without much complexity, appropriate to each of the phases of the Motor Habit raised by G-SE who define it as a relatively permanent change in the potentialities of behavior that can be achieved through

experience or practice and that implies a series of modifications in the CNS area that generally cannot be observed, that can be induced through changes in performance in cognitive and motor aspects. These changes are reflected in an improvement of the information processing capacities (identification of the relevant stimuli, selection and establishment of the parameters of the adequate motor program, establishment of a reference point for correcting the confrontation between expected result and result. real, etc.), which become faster, cheaper and more efficient. As a consequence, the movement becomes safe, fluid and precise.

The stages of the motor Habit phases Motor learning manifests gradually, with the progressive passage from an initial phase of understanding the task and clumsy coordination to a final phase of deep understanding and automation of movement, Glencross, [10] as represented in (table 2) which, in the opinion of the authors, is the most complete characterization of the learning stages of Motor Habit. Núñez, et al [11].

Source: Stages in motor learning; Neuroscience and Sport. Webinarturned_in_not

The methodology to be applied for teaching is of vital importance, through the basic global and fragmentary method as long as the three stages of motor learning are taken into account. Traffic movements from one phase to the next cannot always be accurately identified. In fact, the three stages describe an evolutionary process that cannot truly be rigidly divided, in which stagnation and regressions can occur Jacome (2019).

To carry out this work, the three stages were taken into account, where in each one of them the evaluation of the phases of the free shot was analyzed to determine the effectiveness of the cognitive understanding that children should acquire, starting from the easiest to the most difficult in the different scenarios, the training class or the competition itself with the help of a software for the analysis of human movement. As children learn, the most important motor skills of this age are developed (Flexibility), Coordinative Abilities (balance, agility, coordination, coupling, reaction speed, frequency of movements) etc. which is complemented by the systematic execution of technical exercises etc. Software for the analysis of human movement such as Kinovea. setup.0.8.15 or eUtilius Fair Play version 4.0.1, used by Nieblas et al. [12], in the case of the execution of the technical element free shot, can obtain values related to distance, speed, body segments, angle of departure of the ball and other data for the correct assessment of each of the technical indicators with Biomechanist aspects that are part of the specific objectives in the teaching of sports skills at an early age. Apply pre-sports games to exercise and know the execution, as well as motivation; internal skills competitions, etc. that contribute to the formation of moral and social habits in accordance with the principles of society, paying special attention to what concerns the formal and integral education of the child that create the bases for an adequate psychosocial preparation through the knowledge of the child Sport.

The educational objective at these ages is given to awaken interest and motivation towards the practice of collective sports activities during free time. The fundamental tasks must create a constant interest in sports, so, in the opinion of the authors of this work, habits should be created with respect to the preparation and environment of the game and pre-sports games, competition, always with control and evaluation to determine the execution of the teaching of the ability in all the phases of the habit motor; Núñez et al. [8]. The study carried out by Hernández et al. [11] although it

doesn't show the behavior in the school stage or it intermediates of the teaching process and consolidation, it is an experiment that comes closer to what we seek to arrive with the use of the technology keeping in mind the importance of the nervous system to arrive until the correct automation of the technique taking out profit of the use of the ICT. The investigation on the analysis and the initial phase of the free shot (Figure 3) in the initiation and the high yield is a material of great utility where he/she becomes trained and it consolidates the basketball in Cuba.

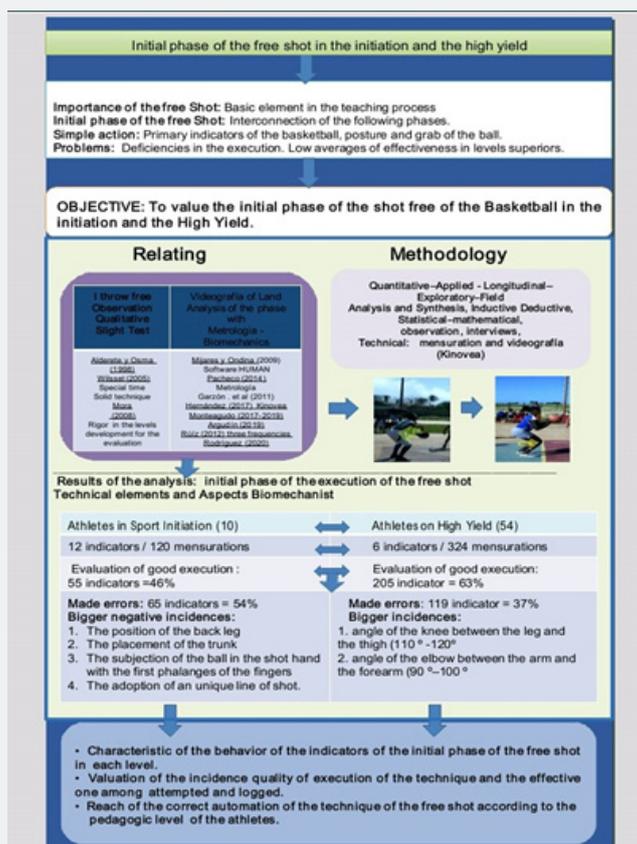


Figure 3: The use of the ICT for an analysis of the technique of free shot in children and young.

References data: Studies of the project institutional free shot for all, UCCFD (2020)

The valuation carried out in the study in the category 9 and 10 years outlines that of the 12 technical indicators with aspects Biomechanist applied 10 players of the category 9 and 10 years in the initial phase of the movement, a good understanding doesn't still exist from the task when being a simple support. Of the 120 mensurations they were evaluated of well 55 for 46%. The carried out errors (65) that represents 54% with a bigger incidence in:

- a) The position of the back leg
- b) The placement of the trunk
- c) The subjection of the ball in the shot hand with the first phalanges of the fingers

- d) The adoption of an unique line of shot [13].

In juvenile athletes some indicators that were made with errors in the initiation group persist but with smaller incidence. The errors made with more frequency in the athletes are related with:

- a) The angle of the knee among the leg the thigh
- b) The angle of the elbow between the arm and the forearm [14].

In the category of high yield single six indicators were evaluated, 63% of the indicators was evaluated of well and in 37% they showed the errors demonstrating that although there are errors in the initial phase of the free shot that you/they are eradicated with the time or they have a favourable behavior there

are others that don't arrive to the correct understanding of the task for what a deep understanding doesn't exist although an automation of the movement exists. The exercises for teaching should be very varied to prevent concentration from being lost, structured from the simple to the complex, with individual exercises, in pairs, trios, etc ; according to the implements, facilities, and what is related to the fulfilment of the weekly controls that are proposed. In the 1st stage of teaching, the aim is to ensure that the children have fun, participate willingly and willingly before the proposed games and those of greater taste to consolidate skills through games while maintaining motivation because their nervous system has not yet fully developed and excitement reactions predominate over inhibition ones, also avoiding the presence of strong external stimuli that can divert their attention and guaranteeing not to reach exhaustion or fatigue since mistakes can be made unconsciously by the kids. The motivation of children and young people for digitized games is known, which is why there are many positive experiences in the use of didactic games or coaches to facilitate teaching [15-20].

So far few indicative Biomechanist of evaluation exists to determine the technical domain reached in the free shot by the players of the Basketball from early ages quantitatively. The use of the technology in the process of technical preparation of the

free shot in the Basketball allows a preparation with sustainable character that respects the indicators of all the components of the preparation in the programs learning and in the plans of training with the files, software or other available tools in the real time or in little time to have a good precision and send of the adaptation of the technical expression, the heart frequency or other available psychological or biochemical indicators inside and outside of the competitive exercise [21].

The teachers' control books can be replaced by digital means (tablets, mobiles, laptop, etc.) for the collection of information, the dissemination of results, the analysis of new experiences, their use as a video or photographic camera, the exchange with students, internet consultation, use as a digital whiteboard, audio recording, transmitting messages or instructions, etc. The usefulness of technology in increasing the levels of the quality of life of athletes in the prevention of injuries can be infinite, the information provided in each of the parameters regarding the correct execution of the technique through Biomechanics aspects reflecting with exactitude the degrees of deviation of the technical gesture (see Figure 4) which, once identified, can anticipate in advance the aspects related to traumas and injuries, mainly of the joints [22].



Figure 4: Use of technology for the evaluation of the technique of Free shot in Basketball for the uniform line.

Source: Biomechanist Study of the execution of the free shot, Hernández and Monteagudo [1]

The analysis carried out in this investigation notices that basic elements of the free shot as the placement of the legs, the one grabs of the ball, the unique line of shot, etc. is aspects that but they are developed appropriately in each one of the stages of the teaching process - learning and consolidation, won't have a correct answer of the habit motor in the process of the athlete's specialization. The use of the ICT can detect on time and with

the biggest accuracy the development of the automation of the movement and in turn to facilitate the actions to achieve the pattern determined in each pedagogic level [23].

Conclusion

a) This study has allowed us to assess the importance of the study and application of the neurophysiological aspects from the Higher Nervous Activity in the cognitive processes in sports initiation, starting from its control and direction to the rest

of the systems and the perfect synchronization between their own centers nervous to ensure adequate responses using the structures that make up the reflex arc.

b) The technologies of the information and the communication have created a great interdependence that you/they impact in the improvement of the theory and practice of the Basketball. The rational use of the technologies the teaching process and consolidation of the free shot facilitates the tools for the correct automation of the technique in each one of the stages

of the phases of the habit motor.

The technologies of the information and the communication have created a great interdependence that you/they impact in the improvement of the theory and practice of the Basketball. The rational use of the technologies the teaching process and consolidation of the free shot facilitates the tools for the correct automation of the technique in each one of the stages of the phases of the habit motor.

Table 1: Analysis of the technical execution of the free shot in the Basketball during the "Latin American event Havana, 2016".

No.	Free Shot (Indicators)	Player 10	Player 13	Player 19	Player 21	Player 22	Average
1.	Angle of the forearm (degrees)	75	89	98	99	105	93.2
2.	Angle thigh leg (degrees)	114	88	115	102	134	110.6
3.	Height of the center of gravity (meters)	0.56	1.16	0.72	0.74	0.75	0.78
4.	Exit speed of the ball (meters per seconds)	7.43	8.33	7.21	7.02	10.2	8.03
5.	Exit angle of the ball (degrees)	46	57	54	52	52	51
6.	Height of liberation of the ball (meters)	1.51	2.71	2.09	1.8	1.81	1.98
7.	Speed of horizontal exit (meters per seconds)	5.1	4.5	4.25	4.4	6.26	4.9
8.	Speed of vertical exit. (meters per seconds)	5.3	6.98	5.8	5.55	7.98	6.32

Table 2: Step of motor habit.

Step I Cognitive Verbal	Step II Motor Habit	Step III Autonomy
Tasks carried out under favourable conditions	Tasks easily performed under favourable conditions	Task carried out safely even in difficult and varied situations
Frequent errors and little economy of movement	Execution corresponding to the technical model under favourable conditions	Perfectly coordinated execution even in difficult situations
Optical information prevails	Important kinaesthetic component	Refined kinaesthetic information
Understanding of the task in broad strokes	Detailed verbal elaboration	Strong ties between motor sensations and language
Confused motor sensations	More precise motor sensations	Exact motor situations
Inaccurate timing, anticipation and representation of movement	More precise programming, anticipation and representation of movement	Detailed programming, anticipation and representation of movement
Tension of antagonistic muscles and reduction of freedom traits	Tension of antagonistic muscles and reduction of freedom traits only in difficult conclusions	Release of all degrees of freedom even in difficult and unforeseen conditions. Attention may be diverted from the execution

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