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Scientific Culture in Sports and Dance Professionals from Biomechanics

Ana Margarita Torres Aguila

Department of Applied Sciences, Faculty of Physical Culture and Sports Science, "Carlos Rafael Rodrígues de Cienfuegos" University, Cienfuegos, Cuba

Email address:
atorres@ucf.edu.cu

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Abstract: The work perfects the interdisciplinary scientific practice of the university students of the Physical Culture career to solve practical situations from society. The general objective is to relate the scientific knowledge of sports and dance professionals from Biomechanics through interdisciplinary scientific practice at the University of Cienfuegos to raise scientific culture and performance in practitioners. Different theoretical and empirical methods were used. Among the first, the historical-logical, analysis and synthesis, document analysis, interviews with selected sports and dance practitioners method was used. The scientific knowledge of Biomechanics and other applied sciences have been valid in the results in sports and dance. The interdisciplinary scientific practice showed favorable results in the development of the physical capacity of strength and flexibility in the practitioners. Interdisciplinary scientific culture was raised in university students belonging to the second-year scientific student group of the Physical Culture career at the University of Cienfuegos. With this research interest in science is activated.

Keywords: Biomecanical, Scientific Culture, Interdisciplinary Scientific Practice

1. Introduction

The movement of scientists is a point to take into account when investigating the process of formation of a national and international scientific culture. From the contribution of scientists in the dissemination of knowledge. Is the case, for example, of the applicability in the context of performance of the scientific knowledge that sports and dance professionals must acquire. In this sense, Cuban science in the education, health, culture and sports areas has reached achievements with a social impact for the benefit of man.

The scientific community seeks revolutionize science in the society where life develops. The educational sphere has undergone considerable changes in recent years of computerization. These results have been satisfactory due to scientific and technological advances, in order to increase the interdisciplinary scientific culture in university students and expand scientific knowledge. However, the limitations to sports and dance professionals are worrying, they have followed the same method for 50 years, thus distancing themselves from what society demands today.

These requirements perfect the interdisciplinary scientific practice of university students of the Physical Culture career, who are capable to solve practical situations from the society. After graduating they can be physical trainers of sports and dance schools. To make possible the results in sports and dance, it is essential to know the physical, chemical and biological functioning and the mechanism of the organism, muscles, ligaments, and joints. How they can be strengthened to avoid the risk of injury.

For these reasons, the value of interdisciplinary scientific practice acquires a priority role to increase interdisciplinary scientific culture, which reflects sports and dance results at the national and international level. Scientific knowledge is relevant from the integration of applied sciences for the quality of life of the practitioners of a certain sport or dance, in a way that contributes to increase the performance in the practitioners and reduce the risk of injuries, as well as chronic diseases by improper posture of the body segments of the trunk, arms and legs.

To think about the scientific culture of the twenty-first century citizen, it is essential to understand science as an

intellectual and social production. “Among the authors studied are Macedo, Arias and Navarro, and Asencio. [1, 2, 5]” All refer to the importance of contemporary technical scientific development in the relationship of interdisciplinary scientific culture from practice, integrating various sciences. This type of culture activates the interests, feelings, and modes of action that enable man to relate harmoniously with context and society.

From this perspective, Biomechanics with physical reasoning presents an applicability from society, by including the relationships between sciences, technology, society (STS), in the integration with other sciences that are more effectively incorporated into the technological dimension of the processes studied. In response to these demands, programs have been proposed by various international organizations aimed at making changes in science teaching. Among them, the United Nations Organization for Education, Science and Culture (UNESCO) and the Organization of Ibero-American States for Education, Science and Culture (OEI) stand out.

Under the leadership of UNESCO, the Decade of Education for Sustainable Development was declared in the period from 2005 to 2014, which was destined to achieve the involvement of all professionals, in the formation of a vigilant cityzenship of the planet's situation and ready for decision making. Currently working on the project "Educational Goals 2021" (OEI). [9]; the strategy of this organization is the incorporation of new information and communication technologies (TIC).

On the other hand, ways must be found to achieve an interdisciplinary scientific culture from practice, with greater relevance in artistic culture and sport. In this regard, “The authors Macedo, Arias and Navarro and Asencio. [1, 2, 5]”. They assume that scientific culture stimulates interest in science in the student, is essential for practical life. Points of contact must be established between various disciplines of knowledge. To work towards the achievement of such purposes, the discipline of Biomechanics must be sustained with the scientific cultural orientation of learning under the integration of science.

At present there is a considerable advance in science from different institutions and educational centers in many countries. Among them, from Latin America such as Brazil, Argentina, Mexico, Venezuela, Colombia, Uruguay. Cuba has not been left behind, above all, in the field of education, health, culture and sports. Scientific and technological development is one of the most influential factors in contemporary society, especially the quality of life of man in interdisciplinary scientific practice related to gesture or motor skills to increase performance and health in this population.

The success of the influence of applied science disciplines on cultural dynamics has been guaranteed by the ways in which content is related, which is promoted in universities. These disciplines have had a great impact on the definition and development of sociocultural practices such as politics, agriculture, economics, health and industry in general. However, much remains to be done regarding the achievement of the interdisciplinary approach. The dispersion of knowledge constitutes a serious obstacle, thus the need arises for collaboration between disciplines, to facilitate the understanding and explanation of the various problems in the sport and dance context. The interdisciplinary scientific culture from the Biomechanics discipline as an integrative science, relate other sciences such as: Morphology, Physiology, Biochemistry. In addition, Psychology is essential to prepare the body and mind in those who practice sports and dance at the service of society. This scientific culture with an interdisciplinary approach, part of the manifestations in the knowledge society in which basic elements that sustain it are established. The university student is not a receiving entity of passive scientific information, but is involved in itself to use it in the way to enrich knowledge with active scientific information from interdisciplinary scientific practice in the Physical Culture career.

The treatment of scientific education in sport as in dance is essential. “The authors Olivella and Marchena, et al. [6, 8]”. The authors raise the need to find actions for the development of relationships between applied sciences today for the benefit of dance practitioners. For this to flow, changes in scientific education are necessary to solve the problems of dance in art schools. Technical improvement, with the study of motor skills to reduce muscle fatigue and avoid injury. The author of the research assumes the aforementioned, since Biomechanics is based on the biomechanical study of movements.

It is necessary to apply empirical instruments to analyze the limitations in this regard. During the interdisciplinary scientific practice carried out in the student scientific group in the 2020-2021 academic year, it is evidenced in the survey carried out 12 second-year students of the Physical Culture career with the aim of verifying scientific knowledge through Sports Biomechanics and this path achieve professional preparation. The following regularities are corroborated: - Lack of understanding of the relationships of physical, chemical and biological sciences with applied sciences. - Limitations of scientific knowledge for Biomechanics with physical reasoning with physical preparation in dance. In this scientific research the following problematic situation is established: How to contribute to the scientific knowledge of sports and dance professionals from Biomechanics through interdisciplinary scientific practice at the University of Cienfuegos? The general objective is to relate the scientific knowledge of sports and dance professionals from Biomechanics through interdisciplinary scientific practice at the University of Cienfuegos to raise the scientific culture and performance in practitioners.

2. Methods

Different theoretical and empirical methods were used in the research. Among the former, the historical-logical method was used in order to systematize the theoretical conceptions

that exist about scientific education from Sports Biomechanics. The process of scientific education is carried out through interdisciplinary scientific practice to increase scientific knowledge in particular, analysis and synthesis in a way that it is possible to integrate the information from the consulted bibliography and the data collected with empirical techniques. The analysis of documents allowed to analyze the training plans of the selected sport and dance.

Documents that offer information about the application of Sports Biomechanics in order to achieve interdisciplinary scientific practice, for this purpose scientific knowledge is raised in the study of motor actions, physical capacities, joint mobility, also injuries caused by lack of warm-up and chronic diseases associated with bad posture, in gymnastics and dance sports practitioners.

The empirical methods used were interviews with practitioners of the selected sport and dance in art schools. It is corroborated in the surveys of applied science specialists, they consider that Biomechanics as an integrative science gives the possibility of improving the results of sport and dance to avoid the risk of injury. For the research, a sample of 12 students belonging to the second-year scientific student group of the Physical Culture career at the University of Cienfuegos was selected. Another selected sample was, dance students from the art school practiced the sport of gymnastics since they were 5 years old.

The assumed research design corresponds to a qualitative approach, non-experimental design, descriptive transectional; in which interdisciplinary scientific practice is described. Consequently education rises scientific from the biomechanical foundations in the practitioners of the sport gymnastics and dance.

2.1. Interdisciplinary Scientific Practice from the Biomechanics Discipline

National and international applied sciences already have an important and powerful theoretical-practical arsenal that conditions the development of interdisciplinary scientific practice and, therefore, scientific education in our educational system, to advance much more towards the future.

“Among the authors studied are Macedo, Arias and Navarro, and Asencio. [1, 2, 5]”. The study of interdisciplinarity enables the integration of science through research. It is a fact that, in general, existing experiences take place in fragmented curricula, so a probably more realistic and effective solution is the combination of the interdisciplinary perspective of science through different subjects, considering technical scientific development, social factors and the ages of the students. According to the aforementioned authors, they affirm that among the challenges of scientific education is the responsibility of the professional, which are oriented in work strategies, it is the acquisition of adequate scientific knowledge to avoid the dangers of scientific ignorance, such as excessive tendency to generalization and a verbalism that conceals insufficient knowledge, when synthesis knowledge is presented and mechanically demanded. Research that addresses aspects of science education shows that, despite difficulties, interdisciplinary scientific practice is possible. In them, common procedures are identified when determining which are the elements around which the integration of applied sciences (establishment of interdisciplinary articulation nodes).

Education has had a scientific-technical advance with a social impact, several scholars of the subject support the interdisciplinary scientific culture. “Among the authors studied are Rivero, M and Rivero, H. [10]”. Who show the integration of the disciplines based on the sciences raising scientific practice in students.

In this article the applied sciences are related to raise the quality of life of the practitioners. Therefore, it is necessary to contribute to the acquisition of scientific knowledge of sports and dance professionals. Researchers from the Central Institute of Pedagogical Sciences (ICCP). [3] The authors state that one of the disciplines that has a relevant influence on the aforementioned aspects is Biomechanics related to other scientific knowledge that its study provides solutions to problems of social and personal interest, through which the professional gives a vision of the world from working with the main concepts, laws, physical principles related to the forms of movement of matter. Also, the fundamental components of the universe, the forces that these exert on each other and the effects of these forces, of vital importance for the rest of the subjects and for the formation of the scientific conception. Education opens the way to scientific knowledge with experimentation in the laboratories of Physics, Chemistry and Biology, however in universities they need resources for the experimentation of the disciplines of applied sciences, therefore, and the expected results are not achieved.

“Another aspect that is addressed in the ICCP [3]”. The attitudes of a group of university students when dealing with scientific culture, based on their participation in the disciplines of applied sciences, with emphasis on Biomechanics. This process of scientific education focuses on attitudes of young people before science, cultural and social barriers to learning, problems for group organization and team participation, as well as contextual conditions.

“According to Hewitt cited by Rivero, M and Rivero, H [10]”. They argue that Biomechanics with physical reasoning is not only a theoretical science, but also an experimental science. Like all science, it looks for its conclusions to be validated through experiments. Given the breadth of the field of study of mechanics, it is the foundation of Biomechanics, as well as its historical development in relation to other applied sciences, it can be considered integral science, since through them gestures or motor skills can be explained. There are several paradigmatic examples of the importance that the discovery of physical and biomechanical phenomena has had in the development of biotechnology and medicine, such as X-rays and nuclear magnetic resonance, both of which allow to obtain an image of the brain from microscopy. Another example with an impact on sports medicine are the

sensors that visualize the internal movement of the human organism when executing a gesture or motor skills. It is simply a matter of relating the sciences in an experimental way, with a view to rising the quality of life in society. All these sciences support the sciences applied to sport, knowledge is provided with a social benefit and that carries out interdisciplinary research in such a way that it achieves greater scientific progress, as a result of this integration. The author's criterion coincides with everything that has been raised and she assumes that scientific activities promote an integral development of interdisciplinary scientific culture in correspondence with scientific-technical advances where the university student is the protagonist of the scientific research.

The teaching of Biomechanics has been proposed to incorporate topics of science, technology and society from the programs of this discipline with other sciences that integrate it to make it more scientific, however, interdisciplinary knowledge is limited in the texts from the understanding of applied sciences to the sport and dance. When consulting articles in journals where experiences are socialized, some insertion of knowledge from the point of view of science is appreciated to give an explanation of concepts, laws and physical principles, but it is still insufficient and there are few scientific activities proposed that respond to the application of this scientific knowledge to raise the quality of life of sports and dance practitioners.

In order to analyze the relevance and social impact of Biomechanics with other applied sciences, "the following examples demonstrated by the authors Olivella; Marchena, et al.; Montoro, and de la Paz; Perdomo, Pegudo and Capote; Perdomo; Estrada; Rivero, M and Rivero, H and Torres. [4, 6, 7, 8, 10, 11, 12, 14]".

In order to exemplify interdisciplinary scientific practices from this perspective, the sport of gymnastics and dance is analyzed from the point of view of Biomechanics with physical reasoning, it is studied by considering that:

1. Our movements are governed by gravity, the attraction that exerts on our body (the gravitational attraction of the earth).
2. Strength and flexibility are the key points in gymnastics and dance.
3. Biomechanics with physical reasoning in the discovery of the conservation of energy, torque and moment of inertia.
4. Physics is a science that needs mathematics to exist, if we want to analyze a physical phenomenon, we need to translate it in some way to a mathematical expression, such as an equation.
5. Biomechanics, Biochemistry, Physiology, etc., shows that it is very difficult to think of genuine advances without a clear knowledge of the physical phenomena involved.
6. Proteins are formed in 3D determines biological function. Although, in the first moments, a protein forms "linearly" it evolves in a short time to form a 3D structure, and this depends on the physical and chemical forces acting between the constituent molecules.
7. Biomechanical science is the knowledge of how the human body works, the muscles and the range of joint movement allowed according to the physical laws in the branch of mechanics.
8. Physics presents essential knowledge for the study of biomechanics, biochemistry, functional anatomy, physiology, kinesiology, cybernetics, among others, and is developed to describe the complete structure of sports and dance performance. The examples corroborate the relationship between Biomechanics and other applied sciences. Interdisciplinary scientific practice has had a social impact on industrialization and the quality of life of the population since the implementation of science and technology.

2.2. Relations Between Biomechanics with a Reasoning and the Analysis of The Practice of Sport and Dance

From Biomechanics you can obtain the essence of new scientific knowledge and other applied sciences such as morphology, physiology and biochemistry, among others, in order to improve practice in sport and dance, which provide university students with an interdisciplinary scientific culture, among them are the magnitudes of physics that support the biomechanical foundations. The study of physical preparation in dance practitioners is essential to analyze the postures, the axis of placement, the physical capacities of strength, flexibility, the speed of movements. For the improvement of the technique, scientific knowledge is needed for the development of the motor skills mentioned above.

In adolescence, deep work must be done on joint muscle mobility from aerobic and anaerobic capacity. Since in these ages it is where greater risk of injuries, when increasing the height and the weight. In the case of stiff muscles, an affectation or injury to the trunk, arms and legs is likely. One of the lines of scientific research associated with the article is the preparation of the athlete and professional training, with the search for strategies to develop gestures or motor skills. There has been a considerable boom in the last decade from applied sciences not only in sports, but also in physical preparation in dance. "Researchers Olivella; Marchena, et al., Montoro and de la Paz; Perdomo, Pegudo and Capote; Perdomo; Estrada; Rivero, M and Rivero, H and Torres [4, 6, 7, 8, 10, 11, 12, 14]". Among the authors affirm that in science applied to sport, the kinematics of gestures should be analyzed. They are relevant from science applied to sport, in order to characterize the athlete's technique. The kinematic parameters that describe the movement to characterize the sports technique and avoid injuries that arise from exceeding certain ranges of motion when performing incorrect techniques. There fore, when performing sports gestures without knowledge of the Interdisciplinary scientific culture, brings as consequences harmful incidents due to injuries that can cause sudden movements without a good warm-up.

The author assumes the aforementioned approaches. However, this theoretical contribution is essential for dance too. Since in this manifestation physical efforts are made, gestures or motor skills are identified. Energy expenditure

prevails, which can cause muscle fatigue. Injuries can arise from improper heating or incorrect postures. Therefore, scientific knowledge is needed from Biomechanics with physical reasoning to obtain a quality of life in practitioners. "The authors Olivella; Marchena, et al.; Montoro and de la Paz; Perdomo, Pegudo and Capote; Perdomo; Estrada and Rivero, M and Rivero, H, Torres and Torres [Torres [4, 6, 7, 8, 10, 11, 12, 14]". assume that the varieties of muscular work are involved in the sporting gesture. Which are determined by the variation of the force of attraction and the length of the muscles in the execution of the technique. In this aspect, the coach limits himself to learning these basic integrative sciences supported by the biomechanical foundations for the development of the sports training process with respect to the physical motor capacities of the practitioners. Sometimes the coach or physical trainer does not look for ways for the practitioner in sport and dance to be able by himself to eradicate technical errors, to understand the importance of muscle movement, they must know and correct abrupt movements to avoid injuries. It is necessary to teach the university student that inappropriate sports gestures bring injuries to the lower and upper extremities.

This analysis is of interest to the scientific community of applied sciences, whether in sports or dance. Biomechanics studies from this perspective the mechanical movement of man in a sporting gesture. "The authors Soto; Montoro and de la Paz, Perdomo. Pegudo, Capote; Perdomo; Torres and Torres [7, 11, 12, 13, 14, 15]". The authors refer that force as any action capable of inducing changes or tendencies to modify the state of rest or constant movement of an object, while muscular force is a capacity functional related to the amount of tension produced by the neuromuscular system.

The author of the present investigation values the current demands that are projected and is a daily influence of the advances of science, the technique and the new rules. The improvement of the results in sport and dance, has repercussions for the improvement, both, the level of preparation of the practitioners, as well as the entire technical and methodological system of the professionals of the sport and dance.

Applied science, such as Biomechanics, provides indispensable tools for study as it optimizes the result of sport and dance. Next, some of the scientific knowledge from Biomechanics with a physical reasoning that favors the practice of sport and dance is presented. Among the essentials are mechanical motion, energy, and the relationship of mass to acceleration. Donskoi, and Zatsiorski. cited by Estrada. [4]".

In the law of mechanical motion, the causes that provoke forces by the action of external agents are analyzed, Newton's first law or the law of Inertia are immersed. Biomechanics they are determined by inertial dynamic characteristics, for example, in sports, free fall is evident. Newton's second law, or Law of Force, is determined by the dynamic characteristics of force in gymnastics. The symbology for the unit of measure of force is the newton. Maximum force is what a muscle can generate at a specific speed. These concepts, laws and physical principles guarantee the fundamentals of Biomechanics. Another application is the study of the types of forces, such as the force of gravity. This analyzes the center of gravity to achieve a balance of the body and that the technique be more effective. Balance is a capacity that is most worked at an early age in gymnastics practitioners and dance. The mechanical and biological properties of muscles are based on elastic force. In the muscular studies of the muscular action in the two extremes of the muscle, three types of dynamic contraction predominate, when the muscular contraction is concentric, it approaches it, they contract favoring muscular movement. If the muscular contraction is eccentric, it moves away, that is, they lengthen, they manifest themselves against the movement. While the static contraction determines the isometric type muscle contraction, here the muscles do not move, they help to fix the movement. It is important to emphasize that the variability of the muscular movement is fundamental to execute the sporting gestures.

In rotational movement physical magnitudes are manifested, such as torque, moment of force and inertia related to bone levers, joint movement are similar to the simple lever mechanism. This knowledge is important for the transition of biokinematic chains, degree of freedom and binding conditions. Biomechanical studies of the hip, knee, and ankle joints are frequent because they present the highest probability of injury, by not performing adequate warm-ups and stretching before and after practicing sports and dance. In Biomechanics, the law of conservation of energy is determined from Physics, by the importance of heat transfer from one place to another. In the energetic characteristics the chemical energy of ATP is transformed, which helps to balance the energy expenditure produced by the execution of the technique in sports and dance. It is the ability to produce a force over a distance (that is, to perform work). The unit of the international system is the Jule. In the Physiology discipline, the physical magnitudes integrated into Biomechanics are also studied, with emphasis on the biological ones, for example, the action potential that is the electrical activity developed in a nerve or muscle cell during depolarization. The resting membrane potential determines the difference in electrical potential between the inside and outside of the cell (across the cell membrane). That resting potential is –70 mV. The partial pressure shows the pressure exerted by a simple gas and a gaseous mixture, such as the partial pressure of oxygen in atmospheric air, which contains oxygen (20.9%), carbon dioxide (0.03%) and nitrogen (79.07%). Knowledge about these magnitudes is essential in the biomechanical study of sports gestures to improve motor skills and avoid the risk of injury. For this reason, the author proposes to include them both in the preparation of the practitioner, the trainer or physical trainer and the rest of the sports and dance professionals.

2.3. Biomechanics Study, a Look from Integrative Physical Science

The body is a whole, in reality it is difficult to distinguish

its components since it is tissue that is being transformed and in this the understanding of Biomechanics plays a fundamental role due to its disciplinary approach from Physics, Biology and Chemistry, which we will study in this explanation. These physical knowledge are the sustenance of the biomechanics of the angular and linear kinematics and their center of mass in the gesture of the upper and lower extremities have relevance in the correction of sports gestures. The muscle variability, where the mechanical and biological properties manifest, the energy expenditure from the perspective of the integration of the aforementioned sciences. The authors Montoro and de la Paz (2015), Soto (2015), Perdomo (2018), Estrada (2018), Torres (2020) and Torres (2021) address in their research the kinematic and dynamic characteristics of man in physical activity in order to analyze gestures in the execution of the movement and improve the quality of life with the help of Physical Culture professionals. However, they are limited to sport and do not apply to physical preparation in dance. In this regard, solutions to problems related to mobility are evident, as well as the improvement of the strength and flexibility of gestures in the execution of the movement of gymnastics and dance sports. Another aspect is how complicated it is to understand the muscular-articular movement of the lower and upper extremities that are prone to injuries.

According to Perdomo (2018), Pegudo and Capote, Perdomo (2018) and Estrada (2018) suggest that the curricular programs of the subject indicate that they defend a rather introductory alternative to specific sports modalities than a multidisciplinary initiation. This criterion is assumed due to the need to find learning with an interdisciplinary approach, achieving a general and comprehensive culture in graduates of the Physical Culture career. To train the athlete it is necessary to study the biomechanical, biochemical and physiological conditions where relationships between Physics, Biology and Chemistry are established. The state of the muscle fibers, tendons and joints is studied to achieve greater effectiveness of the technique and sports gestures. These necessary biological conditions provide the possibilities of transporting oxygen and nutrients to organic tissues, through a optimization of the capillary network and consequently to the improvement of the oxygen consumption capacity. Therefore, moderate intensity exercises are appropriate when the athlete's preparation is not very high. Estrada (2018) studies the gestures of the execution of movements, to achieve a healthy and functional improvement, with an interdisciplinary approach to obtain a higher quality of life and avoid the risk of injuries due to ignorance of science applied to sport.

The aforementioned has a considerable boom in the sciences applied to sports studies the kinematic and dynamic characteristics provide contributions for the gestures of the execution of the movement, the center of gravity, variety of muscular work, the bone lever, tension force, rotary movements, torque and moment of inertia are knowledge of physics as a science that studies, describes and analyzes the causes of mechanical movement that are essential for understanding the movement of man. The authors are Olivella; Marchena; et al. and Soto. [6, 8, 13]". The same suggest that the science of biomechanics studies the mobility of the supporting and mobile leg with the help of joint measurement software to estimate strength. of muscle groups involved in sports training. From this perspective, an analysis is made of the joints, which present a degree of freedom of movement that can be beneficial when there is an adequate position, a prior heating in the areas of greatest vulnerability. In the case of gymnastics or dance sports, to eradicate the incorrect rotation of the turn, it is essential to know the deficiencies from the rotation of the head to the supporting leg, it is a transition of the movement. It is important to emphasize that the production of movement is caused by force, in its structure it acts two effects.

When or is it an external effect, there is a change in the physical state in which the body is found; and if it is internal represents the molecular structure of the body, creating a state of tension that manifests itself with deformation and increased temperature. According to Olivella; Marchena, et al.; Montoro and de la Paz; Perdomo, Pegudo and Capote; Perdomo; Estrada; Rivero, M and Rivero, H; Torres and Torres. [4, 6, 7, 8, 10, 14, 15] That kinematics is the area of mechanics that focuses its study on the movement of bodies in space with a descriptive nature, it did not evaluate the causes that produce them, or the energy expenditure demanded by its realization. For this, there are considerations regarding the mass of the body (center of mass) with projections to the mechanical axis. All mechanical quantities can be expressed by combining three indicators, such as length, time, and mass. For the author of the present investigation, the muscular-articular movement is directly proportional to the sporting gesture in the execution of the technique and the transition of the biokinematic chain. With adequate mobility of the muscles and joints, the sporting gesture becomes effective when these movements are manifested linearly. In addition, when the biomechanical analysis of the muscular-articular movement is done, the benefits are attributed to health, quality of life and better execution of the technique, with this type of study injuries or limitations to perform a certain technique are avoided. It is necessary to analyze that the movement of muscles and joints, when manifested in an appropriate way, implies a high level of coordination between agonist and antagonist muscles in terms of strength and flexibility, but if the muscle group does not develop linearly, it causes an effect contrary to what is desired, there is an imbalance in the balance of muscular strength, which can cause damage to the joints. Muscle elastic force is the ability to overcome or counterbalance a resistance (a weight) through muscular activity. Training seeks develop their different physical abilities. Among them increase muscle mass, strengthen connective and support tissues, improve body constitution. All this, without forgetting the optimal relationship between strength and sports technique to avoid muscle fatigue that can cause injuries.

This scientific knowledge of the trainer or physical trainer

is necessary to strengthen the areas of greatest risk to avoid injuries such as muscle contractions in the practitioners of the sport of gymnastics and dance. Another approach by Estrada (2018) that provides integrated sciences in the work of muscle contraction is a process that begins at the junction of the motor plate (nerve) with the muscle. The same that occurs by the generation of the action potential that passes through the sarcolemma, tubules and the interior of the muscle fiber, the mechanism occurs with the rapid release of calcium. The acquisition of this knowledge in interdisciplinary scientific practice in university students makes the way of thinking and acting more quickly and effectively. If the practitioner is oriented and is able to anticipate through the regulation of their movements, they can achieve an adequate development of the motor action or combination to be executed. Researchers Olivella (2011), Marchena, et al. (2013), Montoro and de la Paz (2015), Perdomo, Pegudo and Capote (2018), Perdomo (2018), Estrada (2018) and Rivero, M and Rivero, H (2019), Torres (2020) and Torres (2021) state that scientific knowledge and motor experience are important to put theory into practice in order to know how to differentiate the physical capacities that need to be strengthened and identify each one from the practice of sport and dance.

3. Results

By this knowledge the practitioner is able to automate his own scientific knowledge preparing the physical and mental body. It is corroborated with interdisciplinary scientific practice with respect to sport and dance. In this way, the university students of the Physical Culture career belonging to the student scientific group manage to strengthen the scientific culture from the discipline of Biomechanics.

4. Discussion

In these interdisciplinary scientific practices in university students carry out a review of scientific information. Study refers to professional training focused on the systematic preparation of the coach or physical trainer in dance. Conceptual schemes are made to establish relationships and put them into practice. Their relation ship with biomechanical, biochemical and physiological studies based on sports training. Next, an example of a biomechanical study is represented, with the study of the physical capacity of strength and flexibility of the sport gymnastics and dance. With the scientific knowledge of Biomechanics and other applied sciences, they have had validity in the results in sports and dance. Interdisciplinary scientific practice demonstrated favorable results in the development of physical capacity for strength and flexibility in practitioners. The interdisciplinary scientific culture was raised in the university students who belong to the second-year scientific student group of the Physical Culture career at the University of Cienfuegos. With this research interest in science is activated. Students from the Cienfuegos art school socialized in the research participated in the achievements. The students through applied biomechanical work obtained results in national and international events, for example, Coreo dance of 2021 sponsored by Liz Alfonso.

5. Conclusions

Biomechanics and its relationship with other disciplines of applied sciences develop interdisciplinary scientific practice, achieving a social impact on the quality of life of practitioners of the sport of gymnastics and dance. It is socialized at the Benny Moré art school since the implementation of the Applied Science. The knowledge of Biomechanics as an integrative science achieves the understanding of the biomechanical study with physical reasoning. Achieves greater effectiveness of sports gestures and motor skills to improve technical results and avoid the risk of injury, thus raising the quality of life in gymnastics and dance sports practitioners.

References

[1] Asencio, E. C. (2017). Scientific education: perceptions and current challenges. Education and Educators, 20 (2), 282-296. DOI: 10.5294/edu.2017.20.2.7. http://www.scielo.org.co/pdf/eded/v20n2/0123-1294-eded-20-02-00282.pdf

[2] Arias, M. & Navarro, M. (2017). Epistemology, Science and Scientific Education: premises, questions and reflections to think about scientific culture. Research news in education, 17 (3), 1-20. DOI: http://dx.doi.org/10.15517/aie.v17i3.29878

[3] Central Institute of Pedagogical Sciences (2013). The School of General Education. Educational Projections and Demands. Havana, Cuba: ICCP.

[4] Estrada. And (2018). Biomechanics: from mechanical physics to the analysis of sports gestures. Universidad Santo Tomás, Bogotá D.C., Colombia Editorial USTA ISBN 978-958-782-132-1. https://repository.usta.edu.co/bitstream/handle/11634/12464/Obra completa.2018Estradayisel.pdf?sequence=1&isAllowed=y

[5] Macedo, B. (2016). Scientific education. Retrieved from www.unesco.org/new/fileadmin/MULTIMEDIA/FIELD/Montevideo/pdf/PolicyPapersCILAC-CienciaEducacion.pdf

[6] Marchena, B. V & Solozano, P. L & Victoria, M (2013). Preparation in dance students at art schools. Efdeportes Magazine. University of computer science. Cuba. 3. http://wwwefdeportes.com> efd122

[7] Montoro, R. & de la Paz, L. (2015). Theoretical bases of sports performance. EFDeportes.com magazine. Buenos Aires, Nº 207 https://www.efdeportes.com/efd207/bases-teoricas-del-rendimiento-deportivo.htm

[8] Olivella, J (2011). Movement. http://movimiento.org> bloqpost

[9] Organization of Ibero-American States for Education, Science and Culture (OEI). 2021 Educational Goals. The education we want for the bicentennial generation. Spain: OEI.

[10] Rivero, M & Rivero, H (2019) Revista Infociencia, ISSN 1029-5186, Vol. 23 (1) p. 71-82. http://www.magon.cu/Doc/Vol%2023%20No1/1112.pdf

[11] Perdomo, J. M, Pegudo, A. G, & Capote, T. E. (2018). Premises for biomechanical research in physical culture. Cuban Journal of Higher Education, 104-114, 37 (2). http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0257-43142018000200008

[12] Perdomo, J. (2018). The professional improvement of sports coaches. (Doctoral Thesis). Central University "Marta Abreu". Villa Clara, Cuba. https://dspace.uclv.edu.cu/bitstream/handle/123456789/11252/Juan%20M.Perdomo%20-Tesis%20Defensa.%20OK.pdf?sequence=1&isAllowed=y

[13] Soto, E. A. (2015). Evaluation of the motor gesture of the lower limbs in the Mae-geri kick in karatecas. Catholic University of Ecuador. Quito. http://repositorio.puce.edu.ec/handle/22000/9264

[14] Torres, A. M (2020). Motor skills in triathlon another look from Physics to Biomechanics. Body, Culture and Movement Magazine. 11 (2). https://revistas.usantotomas.edu.co/index.php/rccm/indexation

[15] Torres, A. M (2021) Biomechanics and combat sports in Cienfuegos. Science and Sport Magazine. 6 (3) 11-14. Edited by the Faculty of Physical Culture of Camaguey Ignacio Agramonte Loynaz. https://revistas.reduc.edu.cu/index.php/cienciaydeporte/article/view/pdf