PODIUM
Journal of Science and Technology in Physical Culture

UNIVERSITY EDITORIAL

Volume 18
Issue 1
2023

University of Pinar del Río "Hermanos Saíz Montes de Oca"

Director: Fernando Emilio Valladares Fuente

Email: fernando.valladares@upr.edu.cu

ISSN: 1996–2452 RNPS: 2148
PODIUM Journal, *January-April 2023; 18(1): e1420*

PODIUM
REVISTA DE CIENCIA Y TECNOLOGÍA EN LA CULTURA FÍSICA

Translated from the original in Spanish

Original article

The dynamics of information and knowledge technologies in Physical Education

La dinámica de las tecnologías de la información y el conocimiento, en la Educación Física

A dinâmica das tecnologias da informação e do conhecimento em Educação Física

Juan Montalvo Carbonell[1*], Mayelin Cabezas Salmon[2], Jonathan González Pieras[1]

[1]Provincial Sports Department. Cuba.

[2]University of the East. Santiago de Cuba, Cuba.

[*]Corresponding author: montalvoc@epdfo.sc.sc.rimed.cu

Received:04/12/2022.
Approved:25/12/2022.

ABSTRACT

It is considered a necessity to promote a new image of school Physical Education from the accompaniment of information and knowledge technologies, considering its informative, interactive, communicative essence and its controversial and active-renovating character that they provide to the physical-sporting activities of great vitality in the context of learning physical exercise. Therefore, the objective is to develop a methodological structure, from the technological-cognitive-motor relationship, based on the dynamics of the interaction of the school with the theoretical knowledge of Physical Education mediated by the use of information technologies and knowledge, in the second cycle of Primary Education. As a result, a didactic tool was generated to stimulate theoretical knowledge in Physical Education, as well as the design of spaces for use as a learning model, aimed at achieving a balance between the technological, the cognitive and the motor in the teaching-learning process. Analysis-synthesis and induction-deduction were used as theoretical methods,

empirical observation, survey and interviews, as well as the mathematical-statistical-descriptive method. It is concluded that the appropriation of theoretical knowledge in an interactive space mediated by computer tools had a positive effect on the learning of physical exercise in schoolchildren, since it strengthened developer and integrative learning during the process.

Keywords: Theoretical knowledge, cognitive, motor, Physical Education, interaction.

RESUMEN

Se considera una necesidad, la de promover una nueva imagen de la Educación Física escolar desde el acompañamiento de las tecnologías de la información y el conocimiento, al considerar su esencia informativa, interactiva, comunicativa y su carácter polémico y activo-renovador que proveen a las actividades físico-deportivas de una gran vitalidad en el contexto del aprendizaje del ejercicio físico. Por lo que se propone como objetivo elaborar una estructura metodológica, desde la relación tecnológica-cognitiva-motora, en función de la dinámica de la interacción del escolar con el conocimiento teórico de la Educación Física mediado por el uso de las tecnologías de la información y el conocimiento, en el segundo ciclo de la Educación Primaria. Como resultado, se generó una herramienta didáctica para estimular el conocimiento teórico en la Educación Física, así como el diseño de espacios para su uso como modelo de aprendizaje, encaminado a lograr un equilibrio entre lo tecnológico, lo cognitivo y lo motor en el proceso de enseñanza-aprendizaje. Se emplearon como métodos teóricos el análisis-síntesis y la inducción-deducción, empíricos la observación, la encuesta y la entrevistas y el método matemático-estadístico-descriptivo. Se concluye que la apropiación del conocimiento teórico en un espacio interactivo mediado por herramientas informáticas tuvo un efecto positivo en el aprendizaje del ejercicio físico en los escolares, pues fortaleció el aprendizaje desarrollador e integrador durante el proceso.

Palabras clave: Conocimiento teórico, cognitivo, motor, Educación Física, interacción.

SÍNTESE

É considerada uma necessidade de promover uma nova imagem da Educação Física escolar a partir do acompanhamento das tecnologias da informação e do conhecimento, considerando a sua essência informativa, interactiva, comunicativa e o seu carácter polémico e activo-renovador que proporcionam às actividades físico-desportivas uma grande vitalidade no contexto da aprendizagem do exercício físico. Portanto, o objectivo é elaborar uma estrutura metodológica, a partir da relação técnico-cognitivo-motora, baseada na dinâmica da interacção do aluno com o conhecimento teórico da Educação Física mediada pela utilização das tecnologias da informação e do conhecimento, no segundo ciclo do Ensino Primário. Como resultado, foi gerada uma ferramenta didáctica para estimular o conhecimento teórico em Educação Física, bem como a concepção de espaços para a sua utilização como modelo de aprendizagem, visando alcançar um equilíbrio entre os aspectos tecnológicos, cognitivos e motores no processo de ensino-aprendizagem. Os métodos teóricos utilizados foram a análise-síntese e indução-dedução, os métodos empíricos foram

a observação, o inquérito e as entrevistas, e o método matemático-estatístico-descritivo. Conclui-se que a apropriação de conhecimentos teóricos num espaço interactivo mediado por instrumentos informáticos teve um efeito positivo na aprendizagem do exercício físico nas crianças em idade escolar, uma vez que reforçou a aprendizagem desenvolvimentista e integradora durante o processo.

Palavras-chave: Conhecimento teórico, cognitivo, motor, Educação Física, interacção.

INTRODUCTION

Physical Education is a pedagogical process that is projected towards the development of the instructive, educational and morphological qualities of schoolchildren so that they achieve an integral formation, where they appropriate knowledge, habits, attitudes and volitional qualities with an active and transformative function, based on a developer and integrative learning.

According to the criteria of López (2006) in Physical Education, above the search for performance is the creation of habits, positive attitudes and concepts that favor sports practice.

Theoretical knowledge has an important function within the class, as support for the development and enrichment of the teaching-learning process (PEA) of Physical Education; this allows the student to understand what he/she is doing and provides meaning and meaning to the new knowledge.

The transmission of theoretical knowledge in Physical Education brings good results to the comprehensive preparation of schoolchildren, which contributes to a better learning and understanding of sports motor skills and physical abilities at the time of execution, both in class as out of it; this provides greater expectations in the appropriation of a general culture.

Theoretical preparation in athletes has as its background the educational orientation Ozolin (1989) and Romero and Becali (2014), among others. In these postulates, it is considered that the appropriation of theoretical knowledge plays an essential role in the formation of criteria, evaluations, self-assessments, analysis, reflections and decision making through the systematization of concepts and interdisciplinarity.

In this sense, López (2006) defines the process of theoretical knowledge in concepts, facts and principles. This vision of theoretical knowledge responds to different moments related to the cognitive field of schoolchildren, directed towards the development of theories and the application of specific solutions to problems of the PEA practice of physical-sports activity.

On the other hand, the proposal of Menéndez *et al.* (2016) who is point out that productive methods make the student think, discover, apply knowledge and intellectual skills to new or changing situations, these learners must be motivated to solve problems individually or collectively, through their productive participation in the class. This constitutes a way of

developing theoretical knowledge during the PEA and favors the comprehensive development of schoolchildren.

Ruiz (2019) states that theoretical knowledge in Physical Education contributes to the development of sports motor skills and physical capacities; also, to the development of moral and volitional qualities of the personality and, at the same time, raises the general culture of schoolchildren. Studies on this subject, carried out by various researchers, help to understand the need generated by this theoretical knowledge, in terms of what to achieve and how to achieve it. This is accompanied by an active and productive orientation during the PEA, together with the necessary elements for the learning of the schoolchildren.

The use of information and communication technologies (ICT) as a didactic medium is considered as a resource that facilitates knowledge. It is about articulating ICT in the PEA of Physical Education as a viable proposal, for the achievement of a conscious, responsible and transforming performance that helps to stimulate and appropriate theoretical knowledge and is designed so that schoolchildren achieve a developer learning from an enriching perspective.

The new curricular perspectives that have emerged in recent years in the PEA of Physical Education, product of the undeniable scientific-technological nature, have produced notable changes and have led the development of the process towards qualitatively higher levels in all the components that integrate it. In addition, the scientific and general updating level must be taken into account to teach the class, as well as the use of methods that promote knowledge and the active and conscious participation of schoolchildren. However, no allusion is made to the use of ICT as a new learning model in the process.

At present, the impressive rise and development of ICT influences the renewal and updating of the PEA, and Physical Education cannot be left out of this process; for this reason, teachers and schoolchildren must participate in the technological transformation that is taking place in the current social and educational context.

ICTs have been defined by various national and international authors in the PEA, such as Fernández and Ladrón de Guevara (2015), Lima and Fernández (2016), Zavaro (2016) and Moro *et al.* (2019), among others; they agree that they are all forms of technological advances that are integrated by those means of information and communication that have emerged as a result of the development of electronic technology. Added to this, an associated resource and conceptual tools as an integrating means within the PEA, where the importance of its use is recognized.

Chen (2019) defines ICT as the set of technologies currently developed for more efficient information and communication. They have modified both the way of accessing knowledge and human relations and contribute to transforming the mental processes of appropriation of knowledge. Moor *et al.* (2019) consider that ICTs bring together a set of systems to manage information, especially the computers and programs necessary to convert, store, manage, transmit, and find it.

Cartaya and del Valle (2017) point out that, conveniently, ICTs can be used as an instrument to facilitate knowledge, but its scope depends on the pedagogical model and the function

that is given to it in the educational process. While, Moor *et al.* (2019) point out that ICT as a didactic tool are designed to intellectually prepare the student to understand and retain new knowledge. These means allow the distribution, expansion, generation of knowledge, debate, research and processing of information; on the other hand, they stimulate learning in a way that is meaningful in the educational environment.

In this study, it is assumed that ICTs are a set of media or information and communication tools that include electronics and technology and allow the capture, production, storage, treatment, and presentation of information with a research and didactic intention; in addition, they are used as a teaching-learning medium.

For this reason, the use of ICT as a didactic tool in Physical Education is accentuated, since it is considered that they develop all the factors that form and enhance theoretical and practical knowledge in the class; this allows active reflection to be generated, and the student becomes the protagonist of his/her own PEA.

Specifically, in the PEA of Physical Education, ICTs have been the subject of research by national and international authors such as Prat *et al.* (2013), Fernández and La drón de Guevara (2015), Quintero *et al.* (2018) and Aznar *et al.* (2019); these studies have specialized in the use of ICT, based on the learning of physical-sports practice.

In Cuba, there has been an approach to the didactics of the use of ICT in Physical Education reflected in different researches such as Lanza, *et al.* (2014) and Pérez, Cedié and Leyva (2014); they indicated its use, based on the training of the new professional and their performance.

Some Cuban researchers such as López (2006) and Ruiz (2019), among others, focus on the PEA of Physical Education and address the need to influence the use of ICT to achieve quality in methodological, organizational work and in the transformations of this subject. Thus, the use of these tools at the organizational level of the process is confirmed; but not in favor of the appropriation of the theoretical knowledge of the students, in their interaction with the contents of the teaching.

From the diagnosis made, it was found:

- Insufficiencies in the appropriation of theoretical knowledge of schoolchildren, through the didactics of Physical Education.
- Inadequate theoretical-practical relationship in the treatment of theoretical knowledge in Physical Education classes.
- Lack of systematic use of ICT, which limits its insertion as a pedagogical mediation.
- Insufficient spaces for the use of ICT as teaching-learning means in Physical Education.
- Predominance of the traditionalist approach in learning tasks.

- Limited use of the potential of these tools in the didactic context of Physical Education, for the management of theoretical knowledge.

For all the above, it is necessary to use ICT in the PEA of Physical Education, in order to achieve a dynamic between the interaction of the school and the theoretical knowledge in the schoolchildren of the second cycle of primary education, in favor of a developer and integrative learning.

The objective of the research consisted of developing a methodological structure from the technological-cognitive-motor relationship, based on the dynamics of the interaction of the school with the theoretical knowledge of Physical Education mediated by the use of ICT, in the second cycle of primary education.

MATERIALS AND METHODS

The following methods were used in the research:

Theoretical methods

Analysis-synthesis, was used to study the theoretical knowledge of Physical Education mediated by ICT, in the second cycle of primary education.

Induction and deduction, was used with the objective of establishing generalizations and reaching conclusions about the theoretical knowledge of Physical Education mediated by the use of ICT, in the second cycle of primary education.

The systemic-structural-functional method was used in the construction of the didactic conception and the elaboration of the methodology to stimulate theoretical knowledge from practical activity in primary Physical Education.

Empirical methods

Scientific observation, was applied through direct perception to verify the dynamics of theoretical knowledge during the PEA of Physical Education and the corroboration of the results of the research proposal.

Interview, applied to teachers and students to find out their opinion on the use of ICT, in the PEA of Physical Education.

Pedagogical Test, was used to know the situation of the problem and assess the result of the proposal in schoolchildren to determine the development of theoretical knowledge.

Review of documents, allowed obtaining information of a scientific nature, contained in the documents issued by the Ministry of Education.

Mathematical-statistical-descriptive method, it was used in the analysis of the results of the diagnosis, assessment, processing and interpretation of the empirical data.

The research work was carried out at the Desiderio Fajardo Ortiz elementary school, of the Aurelio Janet community sports center, located in the 26 de Julio district, in the province of Santiago de Cuba. The population was made up of 48 5th grade schoolchildren and the sample was made up of 32 schoolchildren, with intentional sampling, in the 2019-2020 academic year.

To analyze the access and use of ICT, the following indicators were used in the PEA of Physical Education:

- Access and use of ICT by schoolchildren, based on their learning.
- Orientation of school and extracurricular learning tasks to schoolchildren for the appropriation and stimulation of theoretical knowledge, mediated by the use of ICT.
- Didactic-methodological structuring of teachers to direct the content of theoretical knowledge of the PEA of Physical Education mediated by the use of ICT.

The research allowed to verify insufficiencies in the appropriation of theoretical knowledge mediated by ICT, as well as in the access and use of these digital tools during the PEA of Physical Education.

This study had the purpose of establishing the dynamics of the school's interaction with theoretical knowledge mediated by the use of ICT, through a methodological structure from the technological-cognitive-motor relationship for the stimulation, appropriation and socialization of theoretical knowledge. In physical education class.

Theoretical knowledge as an essential aspect within the PEA of Physical Education mediated by the use of ICT, stems from the need of schoolchildren to learn by doing and to know how to create, from a productive, comprehensive and developer learning. In a general sense, the mediation of digital tools in the appropriation of theoretical knowledge facilitated the achievement, in schoolchildren, of a level of dialectical investigative independence that made it possible to glimpse logically and consciously the contents of Physical Education.

For the research, the criteria of Cartaya and del Valle (2017) were based on, they state that the use of ICT has become increasingly common and essential today and point out that the questions on the subject do not consist of elucidating whether should or should not introduce the use of ICT in the educational process, but when and how.

The process of appropriation and stimulation of the theoretical knowledge of the contents must take place on the basis of a methodological structure. This process constitutes an algorithm for schoolchildren to use ICT logically, based on the learning of theoretical content during the PEA of Physical Education.

RESULTS AND DISCUSSION

The methodological structure of the technological-cognitive-motor relationship of theoretical knowledge of Physical Education has as components:

1. Orientation and awareness.
2. The affective- motivational projection.
3. The research-informative-communication projection.
4. Cognitive-motor appropriation.
5. Theoretical-practical ratio.

In the orientation and awareness, it is established in the methodological structure that originates the technological-cognitive-motor relationship to favor the stimulation, appropriation and construction of theoretical knowledge mediated by ICT and its projection and significance in educational practice, which benefits the theoretical-practical relationship during the classes. This proposal is based on the application of scientific methods that allow an objective and real knowledge and an adequate environment is provided to the students, so that they build their own knowledge and interact individually and in groups with the theoretical content, mediated by the use of ICT.

When considering the potential of the use of ICT, its implementation is recognized as a new learning model in Physical Education that promotes the appropriation of concepts, system of concepts, facts and the contribution of experiences. These are social knowledge of educational scientific activity that have as intellectual products the appropriation, creation and socialization of scientific-research knowledge, its systematization and integration in the class.

In the affective-motivational projection, ICTs are considered as a didactic and entertainment medium that, in itself, provide emotions and joy to schoolchildren. On the other hand, they contribute to the development and benefit of school learning, since they provide appropriate interests towards theoretical knowledge.

The integration of visual and auditory stimuli that ICT possess stimulates and influences the development of evaluative and reflective actions that manage to lead a more comprehensive process and with high effectiveness in learning. This enables schoolchildren to develop their actions in a positive affective-motivational climate and to be able to carry out learning tasks mediated by the use of ICT, to enhance knowledge in an atmosphere that favors the learning process. These assume a leading role in the educational practice of the PEA.

Research-informative-communicational projection, ICTs are influential media and promoters of development, they allow a qualitative leap towards knowledge, through the visual, auditory and textual, and give way to study and research.

These create the possibility for schoolchildren to develop their mental capacities to expand their thinking, by emphasizing the possibility of expanding knowledge beyond their initial learning situation. This is because previous information is extrapolated and observed from various novel perspectives, which is transferred to a new context and satisfies the appropriation of concepts, concept systems, facts and principles (theoretical knowledge).

ICT-mediated research provides arguments, information and communication of various kinds in favor of the content, which provides students with knowledge, experiences, forms of solution in practice and how to transform it. This makes it possible to appropriate and perceive the details of the content accurately, generates new knowledge and enables students to make decisions; which contributes to the improvement of motor representation, from a leading role during the process.

ICTs, as didactic tools, serve the school for the investigation of the contents, starting from the visualized information (cognitive), the reflective analysis and then the evaluative one, from the internal towards its influence on learning, with which accesses the computer-technological, informative and cognitive-motivational application and provides theoretical knowledge mediated by ICT, manifested in a significant need for its performance in practice and its comprehensive training.

Through content-related learning tasks, different digital sources are consulted and schoolchildren are encouraged, appropriate and incorporate theoretical knowledge to make it the object of their learning. With this, the activation in the motor activity is promoted and the regulation and self-regulation of the movement to be carried out in practice is favored.

Cognitive-motor appropriation as a methodological structure establishes a logical and dialectical relationship, which determines the balance of technological possibilities with the intellectual and the motor, in the PEA of Physical Education. The use of ICT allows to penetrate and modify structures on the content that start from interaction and analysis; which enables schoolchildren to become active and conscious processors of the information they receive to later apply it in educational practice.

In this context, the participation of mental action originates from perception and this is ideal to benefit the appropriation and understanding of knowledge; therefore, it makes it easier for them to draw on theoretical knowledge mediated by the use of ICT, which favors cognitive independence in schoolchildren in practice to achieve appropriation and significance of the task they perform.

The theoretical-practical correlation allows searching, accessing, feeling the need to incorporate knowledge and new knowledge to explain and apply objects and phenomena during educational practice.

The theoretical knowledge learned, with the support of the use of ICT, allows them to stimulate and learn to learn, from physical-motor actions, through the significant relationship of theory with practice during the process. The collaboration of theoretical knowledge during practice helps understanding, the search for alternatives and the exposure of criteria that constitute a driving force during learning.

A correct structuring and appropriation of theoretical knowledge mediated with ICTs not only influences the development of action skills, but also leads to learning about action. The knowledge provided by these means allows much more objective and dynamic relationships to be established between theoretical knowledge and educational practice, which stimulates the understanding and application of knowledge in solving problems in educational practice.

Regarding the spaces for the use of ICT, gaps are evident, since there is still no project in the PEA to take advantage of technologies based on learning, preparation and self-preparation.

In the Granma newspaper, official organ of the Central Committee of the Communist Party of Cuba, when referring to the first Business Forum (EmpreEduc), in the context of the 2019 International Pedagogy Congress, some important questions were raised, among them, how can the spaces in the school be used, according to the new learning models? In this same source, the insufficient space designated for the exercise and improvement of the use of ICT was identified.

Fernández and Ladrón de Guevara (2015) state that the application of ICT in schools still does not have a correct implementation within the educational system, specifically in the area of Physical Education, which is currently the subject of debate and evidence that the organizational process to use ICT in Physical Education is insufficient and incoherent, so this research proposes a design of spaces that allows the school to use technologies inside and outside the PEA.

The PEA of Physical Education must guarantee the use of ICT and design the real spaces for its use as a didactic tool. Here, organizational alternatives are established as bases that support access to research and study of the contents of the study units, to achieve the appropriation of the content and raise the quality of learning for schoolchildren.

ICT as didactic tools to manage theoretical knowledge in Physical Education are very useful. However, the existing spaces are not used by teachers and schoolchildren for their use in the PEA. For this reason, spaces were designed, for their proper use, which provide the interaction of schoolchildren with theoretical knowledge, in a dynamic way and with a significant character (Figure 1).

Fig. 1 - *Distribution of spaces for the use of ICT*

ISSN: 1996–2452 RNPS: 2148
PODIUM Journal, January-April 2023; 18(1): e1420

On the access and use of ICT by schoolchildren based on their learning in the PEA of Physical Education, virtual spaces were configured to use these tools, starting from the diagnosis where schoolchildren indicated that they used some digital tools for training, but not in relation to the theoretical content of the sports learned in the classes (Figure 2).

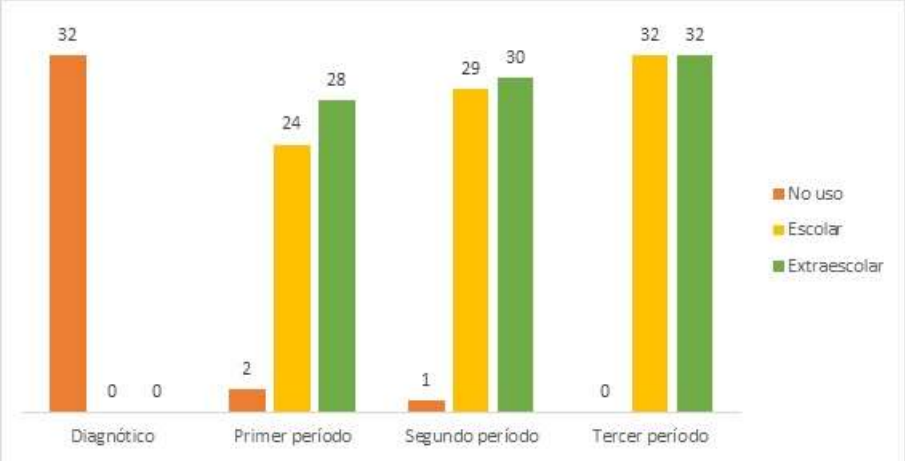

Fig. 2 - *Graphic representation of the evolution of the distribution of spaces for the use of ICT*

After designing and establishing the different spaces for the use of ICT, it was stated that in the first period there was 75 % of the use of ICT in the process of theoretical knowledge of Physical Education; on the other hand, in the use of extracurricular spaces, 87.5 % was evidenced. In the second period, the use of ICT in the school space was shown in 90.6 % and in the extracurricular space in 93.7 %; finally, in the third period in both spaces the use of ICT behaved 100%, which demonstrated a significant interaction.

The methodological structure of interaction with ICTs, articulated with virtual spaces, showed an effectiveness in the dynamics of theoretical knowledge that generalizes the appropriation of concepts, facts and principles of sports learned in classes (athletics, basketball and soccer) by the students. The established mediation scale is very good (4), good (3), fair (2) and bad (1) (Figure 3).

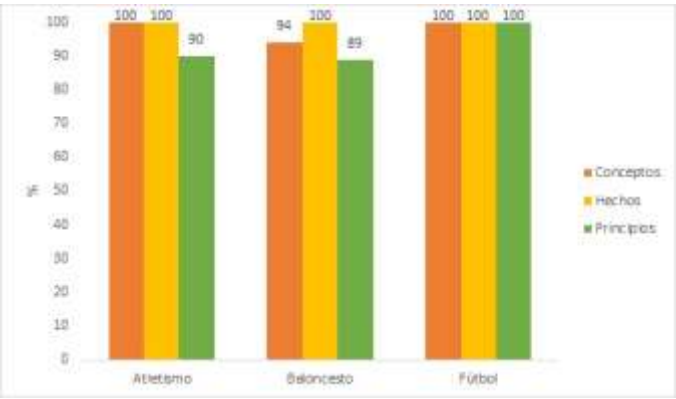

Fig. 3 - *Graphic representation of the behavior of the elements of theoretical knowledge of sports motives to classes*

In the sport of athletics, the appropriation of the theoretical knowledge of Physical Education about the concepts and the facts presented a 100% effectiveness. Not so, the principles that behaved with 90%. In basketball, the facts behaved with 100 %, the concepts with 94 % and the principles with 89 % effectiveness. Finally, in soccer all the elements behaved with 100 %, since the stimulation and appropriation of this in the PEA of Physical Education was achieved.

The results of the research are consistent with what was stated by Cabero *et al.* (2018) who refer that virtual teaching environments must incorporate didactic materials characterized by presenting knowledge through varied languages such as texts and images. Therefore, the use of ICT is considered as an ideal tool for the stimulation of theoretical learning in Physical Education classes.

The proposed methodological structure reaffirms what was stated by Rovira *et al.* (2019), which recommends the use of ICT to consistently plan the PEA, where they highlight that the organization, communication in the development of sessions and evaluation lead to the success of learning; therefore, it expresses the practical significance of its use.

CONCLUSIONS

The study of ICT, in the context of learning Physical Education in second cycle schoolchildren, allowed to favor spaces of interactivity for the appropriation of theoretical knowledge. It was possible to positively influence the process of stimulation and management of the content of the sports studied in class, through the cognitive-technical-motor unit and made it possible for the students to produce high levels of theoretical knowledge, manifested in practice with a good significance given in the learning tasks.

The use of ICT in the PEA of Physical Education, was consolidated as a didactic tool that contributed to strengthen value and critical judgments. That is why the need to make intelligent use of the available information becomes valid, to transform it into meaningful content that meets the needs of schoolchildren.

REFERENCES

Aznar-Díaz, I., Cáceres-Reche, M. P., Trujillo-Torres, J. M. & Romero-Rodríguez, J. M. (2019). Mobile learning y tecnologías móviles emergentes en Educación Infantil: percepciones de los maestros en formación. Espacios 40 (5) https://revistaespacios.com/a19v40n05/a19v40n05p14.pdf

Cabero-Almenara, J., Gallego-Pérez, O., Puentes-Puente, A.J. y Jiménez-Rosa, T. (2018). La "Aceptación de la Tecnología de la Formación Virtual" y su relación con la capacitación docente en formación virtual. *EDMETIC, 7* (1), 225-241. https://doi.org/10.21071/edmetic.v7i1.10028

Cartaya. L. & del Valle, M. (2017). *La informática como medio de desarrollo en la infancia preescolar*. Habana: Editorial Pueblo y Educación. https://books.google.com.cu/books/about/La_inform%C3%A1tica_como_medio_de_desarrollo.html?id=MzIKxgEACAAJ&redir_esc=y

Cedié-Casero, Y. & Leyva-Frómeta, Y. (2014). Impacto de las Tecnologías de la Información y las Comunicaciones (TIC) en la asignatura Educación Física Preescolar en la carrera de Cultura Física de la UCCFD `Manuel Fajardo' de Guantánamo. *Lecturas: Educación Física y Deportes 18* (190). https://efdeportes.com/efd190/impacto-de-las-tic-educacion-fisica-preescolar.htm

Chen, C. (2019), Qué son TIC (Tecnologías de la información y la comunicación): https://www.significado.com/tecnologia/

Fernández, C. & Ladrón- de-Guevara, L (2015) El uso de las TIC en la Educación Física actual. *Revista de Educación Motricidad e Investigación* 5, pp. 27-40. http://dx.doi.org/10.33776/remo.v0i5.2740

Lanza-Escobar, N., Amador-Cabrera, A., & Soto-Paulín, M. (2014). La Educación Física antes y después de 1959, su tratamiento desde la teoría y metodología de la Educación Física. *PODIUM - Revista de Ciencia y Tecnología en la Cultura Física, 9*(2), pp. 206-216. https://podium.upr.edu.cu/index.php/podium/article/view/439

Lima-Montenegro, S., & Fernández-Nodar, F. A. (2016). La educación a distancia en entornos virtuales de enseñanza aprendizaje. Reflexiones didácticas. *Revista Tecnología Educativa*, *1*(1). https://tecedu.uho.edu.cu/index.php/tecedu/article/view/14

López, A. (2006). *El proceso de enseñanza-aprendizaje en Educación Física*. Editorial Científico-Técnico. https://isbn.cloud/9789597133209/el-proceso-ensenanza-aprendizaje-en-educacion-fisica/

Menéndez, S., Calderón, C. Y., Mejías, G., & Valdés, Y. (2016). *Un enfoque productivo en la clase de Educación Física contemporánea*. Habana: Editorial Pueblo y Educación.

Moro, A., Dupotey, N., y Salgado, A. (2019). Las TIC como herramienta didáctica. *Estudio Universidad de Oriente. Refcale, 7*(3), pp. 151-160. http://refcale.uleam.edu.ec/index.php/refcale/article/view/2742/1854

Ozolin, N.G. (1989). *Sistema contemporáneo del entrenamiento deportivo*. Habana: Editorial Científico-Técnico. https://books.google.com.cu/books/about/Sistema_contempor%C3%A1neo_de_entrenamiento.html?id=s3jxswEACAAJ&redir_esc=y

Pérez Sánchez, R. (2014). *Infancia, socialización y TIC. En: PROSIC. informe Anual Hacia la Sociedad de la Información y el Conocimiento 2013*. Universidad de Costa Rica: Editorial SIEDIN. http://www.prosic.ucr.ac.cr/informe-2013

Prat-Ambrós, Q., Camerino-Foguet, O., Coiduras Rodríguez, J. L. (2013). Introducción de las TIC en educación física. Estudio descriptivo sobre la situación actual. *Apunts*. 113, 37-44. https://dialnet.unirioja.es/servlet/articulo?codigo=4419519

Quintero, L.E., Jiménez, F.J., & Area, M. (2018). Más allá del libro de texto. La gamificación mediada con TIC como alternativa de innovación en Educación Física. *Retos*, (34), pp. 343-348. https://publicaciones.uci.cu/index.php/serie/article/view/1144

Romero-Esquivel, R.J. & Becali-Garrido, A.E. (2014). *Metodología del entrenamiento deportivo, La Escuela Cubana*. Habana: Editorial Deportes. https://books.google.com.cu/books/about/Metodolog%C3%ADa_del_entrenamiento_deportivo.html?id=P9MDEAAAQBAJ&source=kp_book_description&redir_esc=y

Rovira-Collado, J., Ambros-Pallares, A., & Hernández-Ortegas, J. (2018). Innovación educativa y uso de las TAC en el Máster de Secundaria: propuesta formativas para docentes ecuatorianos en el programa UB-UNAE. *Tejuelo 30*, pp. 73-110. https://doi.org/10.17398/1988-8430.30.73

Ruiz-Aguilera, A. (2019). *Teoría y metodología de la Educación Física y el deporte escolar*. Habana: Editorial Pueblo y Educación. https://repositorio.espe.edu.ec/jspui/bitstream/21000/9227/3 /Teoria%20y%20metodologia%20de%20la%20educacion%20fisica.pdf

Zavaro, L. (2016). *Informática aplicada a la auditoría moderna*. Habana: Editorial UH Dirección de Publicaciones Académicas. https://www.claustrofobias.com/informatica-aplicada-a-la-auditoria-moderna/

Conflicts of interest:
The authors declare not to have any interest conflicts.

Contribution of the authors:
The authors have participated in the writing of the work and analysis of the documents.