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*Translated from the original in spanish*

**Artículo original**

## **Remote Physical Education: motor games and kinesthetic intelligence during the COVID-19 pandemic**

**Educación Física remota: juegos motrices e inteligencia kinestésica durante la pandemia COVID-19**

**Educação física à distância: jogos motores e inteligência quinestésica durante a pandemia de COVID-19**

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## ABSTRACT

In the context of the pandemic, Physical Education in Ecuador, as well as other subjects, have worked through interdisciplinary projects under the project-based learning methodology. The objective of this research was to verify to what extent motor games in remote Physical Education influence the development of kinesthetic intelligence of schoolchildren in a particular educational institution in Quito. It is framed in a quantitative paradigm, corresponding to a quasi-experimental design of descriptive and transversal character, with pretest and post-test measures, without control groups. The sample consisted of 22 students in the third year of General Basic Education. The inclusion parameter was established as being enrolled and attending the virtual classes of Physical Education. An instrument was constructed with an estimation scale of the dimensions for kinesthetic intelligence of the adaptation of Gardner's test: *use the body movements as the main tool of expression* [UMCPHE]; *show sports and athletic skills* [MHDA]; *enjoy participating in dance and dramatic art activities* [DPADAD]; *show ability in performing manual work and using tools* [MHRTMUH] and *learn better when the body is involved in the activities* [AMCIA]. This study showed that innovative strategies based on motor games through remote Physical Education are an alternative to encourage the improvement of kinesthetic intelligence, in addition to the fact that Physical Education has had to be transformed in terms of the use of appropriate teaching strategies, reflecting that kinesthetic intelligence is transcendental, because it has a significant impact on the development of the intellectual capacity of students in their level of self-esteem and generation of autonomy towards motor games.

**Keywords:** Games; Motor skills; Kinesthetic intelligence; Virtuality.

## RESUMEN

En el contexto de la pandemia, la Educación Física en el Ecuador, al igual que las demás asignaturas, han trabajado por proyectos interdisciplinarios bajo la metodología del aprendizaje basado en proyectos. Esta investigación planteó como objetivo verificar en qué medida los juegos motrices en la Educación Física remota influyen en el desarrollo de la inteligencia kinestésica de los escolares de una institución educativa particular de Quito. Se enmarca en un paradigma cuantitativo, correspondiente a un diseño cuasiexperimental de carácter descriptivo y transversal, con medidas pretest y postest, sin grupos de control. La muestra fue 22 estudiantes del tercer año de Educación General Básico. Se estableció como parámetro de inclusión el estar matriculado y que asistieran a las clases virtuales de Educación Física. Se construyó un instrumento con una escala de estimación de las dimensiones para la inteligencia kinestésica de la adaptación del test de Gardner: *utiliza los movimientos del cuerpo como principal herramienta de expresión* [UMCPHE], *manifiesta habilidades deportivas y atléticas* [MHDA], *disfruta de participar en actividades de danza y arte dramático* [DPADAD], *manifiesta habilidad en la realización de trabajos manuales y utilización de herramientas* [MHRTMUH] y *aprende mejor cuando el cuerpo se ve involucrado en las actividades* [AMCIA]. Este estudio demostró que las estrategias innovadoras basadas en los juegos motrices a través de una Educación Física remota son una alternativa para poder incentivar a la mejora de la inteligencia kinestésica, además que la Educación Física ha tenido que transformarse en cuanto al uso de estrategias de enseñanza adecuadas, reflejando que la inteligencia kinestésica es trascendental, porque tiene un impacto significativo en el desarrollo de la



capacidad intelectual de los estudiantes en su nivel de autoestima y de generación de autonomía hacia el juego motriz.

**Palabras clave:** Juegos; Motricidad; Inteligencia kinestésica; Virtualidad.

## RESUMO

No contexto da pandemia, as Educação Física no Equador, bem como os outros temas, têm trabalhado através de projetos interdisciplinares sob a metodologia de aprendizagem baseada em projetos. O objetivo desta investigação era verificar até que ponto os jogos motores da Educação Física à distância influenciam o desenvolvimento da inteligência quinestésica das crianças em idade escolar numa determinada instituição de ensino em Quito. Está enquadrado num paradigma quantitativo, correspondendo a um desenho quase experimental de carácter descritivo e transversal, com medidas pré e pós-teste, sem grupos de controlo. A amostra foi de 22 estudantes do terceiro ano do Ensino Básico Geral. O parâmetro de inclusão foi estabelecido como estando inscrito e frequentando as aulas virtuais de Educação Física. Um instrumento foi construído com uma escala de estimativa das dimensões de inteligência quinestésica da adaptação do teste de Gardner; usa os movimentos corporais como principal ferramenta de expressão [UMCPHE], mostra capacidades desportivas e atléticas [MHDA], gosta de participar em atividades de dança e arte dramática [DPADAD], mostra capacidade de executar trabalhos manuais e usar ferramentas [MHRMUIH] e aprende melhor quando o seu corpo está envolvido nas atividades [AMCIA]. Este estudo mostrou que estratégias inovadoras baseadas em jogos motores através da Educação Física remota são uma alternativa para encorajar a melhoria da inteligência quinestésica, além disso, a Educação Física teve de ser transformada em termos da utilização de estratégias de ensino apropriadas, refletindo que a inteligência quinestésica é transcendental, porque tem um impacto significativo no desenvolvimento da capacidade intelectual dos estudantes no seu nível de autoestima e de geração de autonomia para o jogo motor.

**Palavras-chave:** Jogos; Motricidade; Inteligência quinestésica; Virtualidade.

## INTRODUCTION

In the context of the pandemic, Physical Education in Ecuador, as well as the other subjects, have worked through interdisciplinary projects under the project-based learning methodology (Ministry of Education, 2020a). Following this guide, all of them aim at the fulfillment of a single objective, with this it has been intended to guarantee the students' knowledge in remote education.

This remote Physical Education is taught from virtual platforms in a synchronous and asynchronous way, and by means of pedagogical cards printed and distributed to students who do not have connectivity possibilities and devices throughout the country. This modality aims for students to acquire, in addition to the essential basic performance criteria skills or also called apprenticeships, problem-solving skills through the process of learning for their autonomy.

For this, the Ministry of Education prioritized the skills with essential basic performance criteria of the 2016 curriculum (Ministerial Agreement N°020A, 2016) and considers the interdisciplinarity between the areas of knowledge and the context of the country's health emergency (Executive Decree N° 1126, 2020). This generates a Prioritized Curriculum for the Emergency that is framed in the support of families and the teacher



as true motivators and guides of knowledge, with maximum flexibility and a line of emotional containment in the teaching-learning process (Ministry of Education, 2020b).

In this sense, Physical Education at home focuses on generating movement from a ludic approach (Posso Pacheco, *et al.*, 2020b). As a discipline, all activities are designed so that there is an atmosphere of fun and recreation among family members, in accordance with Huarcaya Victoria (2020). In this work, it is proposed that during the pandemic, motor activities should be generated to combat stress and depression caused by confinement.

It is also important that these activities acquire a game format, in which the skills are developed with performance criteria of the four main blocks (Posso Pacheco, *et al.*, 2020a). Therefore, it is necessary to emphasize that play as a means of teaching plays a central role in children who spend a lot of time engaged in this activity; that is, they engage in physical activity (Armstrong, 2004).

In this same perspective, it can be mentioned what Ferrer (2003) highlights, that in the field of learning, kinesthetic intelligence goes hand in hand with play, because play is a permanent discovery from the social, cognitive, emotional and motor aspects. In summary, it is stated that games can promote the participation of children in educational action in the pandemic (Posso Pacheco *et al.*, 2020c).

Seen in detail, kinesthetic intelligence is the capacity to use the whole body to express thoughts and feelings, as directed by the national Physical Education curriculum. Therefore, the curriculum prioritized for emergence with games stimulates movement, action, expression, and imitation, among others (Martín and Soto, 2007). In addition, it is necessary to provide strategies to satisfy their potential and interests, taking into account their evolutionary development and strengthening the emotional aspect. This premise is fundamental for schoolchildren to feel safe and to achieve interpersonal relationships, learning and integral control.

From this point of view, kinesthetic intelligence is considered a physical ability, which is combined with the development of social emotions, which fosters the social-emotional skills of a person. Children growing up are full of confidence, sense of security and can express joy and interest in the performance of activities. These skills successfully address basic learning concepts that strengthen their sense of responsibility and they possess key skills when facing the task in the social context (Cerdeira Chimbo and Núñez Roldán, 2012).

Children's emotional development is achieved through primary internal actions that allow them to interact with their experiences (Goleman, 1996). Therefore, when activities that strengthen kinesthetic intelligence are carried out, the construction of the psychological field of kinesthetic intelligence in infants will be strengthened. This establishes their independence, which is a required element in their social domain; this allows the learner to acquire interest in their inner and everyday world, and consolidates socialization and socioemotional development.

To a large extent, children's intelligence at this stage is derived from motor behavior; it ensures that this vital development is achieved. Activities correctly determine their value, which is the basis for determining the logical structure of reality. This basis ensures the transition from the stage of perception movement to the stage of specific operation, and the progressive development until the comprehensive development of their psychomotor skills is achieved.



It is convenient to determine that the human being is a functional unit in which exercise and motor functions are closely related. Therefore, Physical Education needs a means, program or tool to support motor games as a means to enhance kinesthetic intelligence. This need emerges in order to adapt the teaching procedures to the needs of the students.

With this background, the objective of this research is to verify to what extent motor games in a remote Physical Education influence the development of kinesthetic intelligence of school children in a private educational institution in the city of Quito.

## **MATERIALS AND METHODS**

A quasi-experimental design study was carried out with pre- and post-test measures without a control group, with a longitudinal, descriptive, analytical and comparative cut.

The sample consisted of 22 (11 boys and 11 girls) students in the third year of the middle school sublevel of the General Basic Education level of a private educational institution in the city of Quito. The inclusion parameter was established as being enrolled and attending all the virtual classes of Physical Education.

To carry out this research, the directors of the institution and the parents gave their written authorization and all the students in the sample gave their consent, after having informed them in detail about the purpose of the study.

At the beginning of the first semester in October 2020, through the Zoom platform of the educational institution, the research instrument (pretest) was applied for the first time to determine the initial development level of the constituent dimensions of kinesthetic body intelligence. The total number of Physical Education classes administered throughout the semester was monitored. At the end of the period, at the end of January 2021, the research team applied the post-event test (posttest). For the purpose of the research, a scale for estimating the dimensions for kinesthetic body intelligence of the Gardner 2001 test adaptation was constructed as a research instrument; *use the body movements as the main tool of expression* [UMCPHE]; *manifest sports and athletic skills* [MHDA]; *enjoy participating in dance and dramatic art activities* [DPADAD]; *manifest skill in performing manual work and using tools* [MHRMTUH]; *learn better when the body is involved in activities* [AMCIA]. The information used for the analysis was collected through observations supported by the aforementioned instruments. The level of each dimension was appreciated and weighted according to the following criteria: not observed [NO] = 0; rarely [PO] = 2; frequently [F] = 4 and always [S] = 6.

The instrument was validated through a judgment of experts, selected with the following inclusion criteria: specialists in the area of Physical Education, researchers with scientific publications in the area, ten years of teaching experience in the area. In the first circulation, there were positive coincidences in each of the dimensions.

For descriptive statistics, correlation calculations were made with the Spearman coefficient, between the dimensions of kinesthetic body intelligence analyzed, the internal consistency Cronbach's Alpha and gender differences. The Shapiro-wilk normality test shows a normal distribution, and a parametric test was performed to compare the difference between the motor games and the dimensions already





mentioned with Student's t-test for independent samples before the intervention and the t-test for related samples for comparisons before and after the intervention. For the different tests, the significance level is set at  $p \leq 0.05$ , the Excel 2013 statistical package was used.

## RESULTS AND DISCUSSION

### Before the intervention

The descriptive statistics mean and standard deviation are shown in Table 1, related to the scores obtained in the dimensions of kinesthetic body intelligence analyzed and the degree of correlation between them. This relationship shows internal consistency in the dimension: *use the movements of the body as the main tool of expression* (UMCPHE) with others, Cronbach's alpha ( $\alpha$ )= 0.970; In the dimension, *manifest sports and athletic skills* (MHDA) ( $\alpha$ )= 0.967; in the dimension, *enjoy participating in dance and dramatic art activities* (DPADAD) an ( $\alpha$ )= 0.996; for the dimension, *manifest skill in performing manual labor and using tools* (MHRTMUH), an ( $\alpha$ )= 0.975 is shown; and in dimension AMCIA ( $\alpha$ )= 0.995 (Table 1).

**Table 1.** - Statistics: Mean (M), Standard Deviation (SD), Kurtosis (Kurtosis), Skewness (Skewness), Cronbach's Alpha and correlations between kinesthetic body intelligence dimensions

| <b>o</b>       | <b>M</b> | <b>DE</b> | <b>Curt.</b> | <b>Asim.</b> | <b><math>\alpha</math></b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |
|----------------|----------|-----------|--------------|--------------|----------------------------|----------|----------|----------|----------|----------|
| <b>UMCPHE</b>  | 2,36     | 1,59      | -1,29        | -0,35        | 0,970                      | 1        |          |          |          |          |
| <b>MHDA</b>    | 2,18     | 1,62      | -1,44        | -0,18        | 0,967                      | 0,859    | 1        |          |          |          |
| <b>DPADAD</b>  | 3,36     | 1,29      | 1,05         | -0,76        | 0,996                      | 0,396    | 0,330    | 1        |          |          |
| <b>MHRTMUH</b> | 2,55     | 1,53      | -1,04        | -0,53        | 0,975                      | -0,085   | -0,195   | 0,183    | 1        |          |
| <b>AMCIA</b>   | 2,09     | 1,31      | -0,37        | -0,04        | 0,995                      | 0,350    | 0,351    | 0,487    | -0,311   | 1        |

\* The correlation is significant at the 0.01 level (bilateral).

In the same order, a significant and varied correlation is observed between the dimensions of kinesthetic body intelligence, where the correlation between: *use the body movements as the main tool of expression* (UMCPHE) with *manifest sports and athletic skills* (MHDA)=0.859, considered as positive and high, stands out. Also correlated are: *enjoy participating in dance and drama activities* (DPADAD) with *use the body movements as the main tool of expression* (UMCPHE)=0.396. Similarly, the correlation of: *manifest sports and athletic skills* (MHDA)=0.330 with *learn better when the body is involved in activities* (AMCIA). In the same way, they reveal correlation: *use the movements of the body as the main tool of expression* (UMCPHE)=0.350 with *manifest sports and athletic skills* (MHDA)=0.351.

The following are considered as positive and low: *manifest skill in performing manual labor and using tools* (MHRTMUH) with *use the body movements as main tool of expression* (UMCPHE)=-0.085. In addition, this correlation is joined by: *manifest sports and athletic skills* (MHDA)=-0.195, all of which are considered negative and low. Also, *manifest skill in performing manual labor and using tools* (MHRTMUH) with *enjoy of*



*participating in dance and dramatic arts activities (DPADAD)*=0.183 considered positive and low; *learn best when the body is involved in the activities (AMCIA)* with *enjoy participating in dance and dramatic art activities (DPADAD)*=0.487 considered positive and moderate; *learn best when the body is involved in the activities(AMCIA)* with *manifest skill in performing manual labor and utilizing tools (MHRTMUH)*=-0.311 considered negative and low.

Table 2 shows the independent tests according to gender. It is observed that there is a significant difference in the dimension *use the body movements as the main tool of expression (UMCPHE)* ( $p=0.341$ ) between the sexes, with the female gender obtaining higher average scores than the male gender. Likewise, there is a statistically significant difference in the dimensions *manifest sports and athletic skills (MHDA)* ( $p= 0.140$ ), *manifest skill in performing manual work and using tools (MHRTMUH)* ( $p= 0.341$ ). In the dimension, *learn better when the body is involved in the activities (AMCIA)* ( $p= 0.432$ ). On the other hand, in the dimension *enjoy participating in dance and drama activities (DPADAD)* no statistically significant differences were observed (Table 2).

**Table 2.** - Dimensions of kinesthetic intelligence according to gender

| Dimension | Female<br>(11) |      | Male<br>(11) |      | t      | p     |
|-----------|----------------|------|--------------|------|--------|-------|
|           | M              | DE   | M            | DE   |        |       |
| UMCPHE    | 2,73           | 1,62 | 2,00         | 1,55 | 1      | 0,341 |
| MHDA      | 2,73           | 1,62 | 1,64         | 1,50 | 1,604  | 0,140 |
| DPADAD    | 3,82           | 1,08 | 2,91         | 1,38 | 1,838  | 0,096 |
| MHRTMUH   | 2,91           | 1,38 | 2,18         | 1,66 | 1      | 0,341 |
| AMCIA     | 1,82           | 1,08 | 2,73         | 1,50 | -0,820 | 0,432 |

### After the intervention

The descriptive analysis of the results obtained from the applied instrument and based on the treatment with motor games is presented below, taking into consideration the overall characteristics of the sample and its statistical significance (p) in all the dimensions of kinesthetic intelligence researched. Table 3 shows a significant increase in the means of the dimensions of kinesthetic intelligence skills after the treatment with motor games.





**Table 3.** - Dimensions of Kinesthetic Intelligence pretest-posttest

| Dimension | Pretest |      | Posttest |      | t       | p     |
|-----------|---------|------|----------|------|---------|-------|
|           | M       | DE   | M        | DE   |         |       |
| UMCPHE    | 2,36    | 1,59 | 4,82     | 1,59 | -13,420 | 0,000 |
| MHDA      | 2,18    | 1,62 | 4,91     | 1,19 | -9,721  | 0,000 |
| DPADAD    | 3,36    | 1,29 | 5,82     | 0,59 | -9,407  | 0,000 |
| MHR TMUH  | 2,55    | 1,53 | 4,91     | 1,19 | -8,342  | 0,000 |
| AMCIA     | 2,09    | 1,31 | 4,55     | 1,41 | -10,894 | 0,000 |

Tables 4 and 5 show the pretest and posttest results of the dimensions of kinesthetic intelligence by gender. From what was observed, it can be affirmed that there was a significant increase in the means of the dimensions studied in both the female and male groups, after the treatment based on the motor games (Table 4) and (Table 5).

**Table 4.** - Dimensions of female pretest-posttest kinesthetic intelligence

| Dimension | Pretest |      | Posttest |       | t      | p     |
|-----------|---------|------|----------|-------|--------|-------|
|           | M       | DE   | M        | DE    |        |       |
| UMCPHE    | 1,62    | 0,64 | 3,10     | 0,57  | -8,642 | 0,000 |
| MHDA      | 1,92    | 0,59 | 2,80     | 0,632 | -4,626 | 0,001 |
| DPADAD    | 1,52    | 0,43 | 2,80     | 0,63  | -7,362 | 0,000 |
| MHR TMUH  | 1,94    | 0,55 | 2,90     | 0,74  | -6,292 | 0,000 |
| AMCIA     | 1,80    | 0,53 | 2,90     | 0,18  | -5,236 | 0,001 |

**Table 5.** - Dimensions of male pretest-posttest kinesthetic intelligence

| Dimension | Pretest |      | Posttest |      | t      | p     |
|-----------|---------|------|----------|------|--------|-------|
|           | M       | DE   | M        | DE   |        |       |
| UMCPHE    | 2,00    | 1,55 | 4,73     | 1,62 | -8,964 | 0,000 |
| MHDA      | 1,64    | 1,50 | 4,73     | 1,35 | -6,249 | 0,000 |
| DPADAD    | 2,91    | 1,38 | 5,64     | 0,81 | -6,708 | 0,000 |
| MHR TMUH  | 2,18    | 1,66 | 4,55     | 1,29 | -4,485 | 0,001 |
| AMCIA     | 2,36    | 1,50 | 4,73     | 1,35 | -6,500 | 0,000 |



## DISCUSSION

The benefits of motor games are well known and considered necessary in school sports activities. This study shows that innovative strategies based on motor games through a remote Physical Education provoked by COVID-19, are a real alternative to encourage the improvement of kinesthetic intelligence in children. When considering the above, it is necessary to emphasize the theory described by [López \(2000\)](#), who states: "Children's play is the best example of spontaneous learning" (p. 59) and [Posso Pacheco et al., \(2020c\)](#) when mentioning that play is a fundamental basis for strengthening the emotional containment of children who have been impacted in some way by the pandemic situation.

Therefore, in the context of the pandemic, motor games are important in school motivation in a virtual Physical Education, which are developed in interdisciplinary learning projects, because they represent a large amount of experiential stimulation and promote the development of skills with performance criteria of the areas of knowledge.

To this end, the entertainment achieved through play is a way to explore, discover, build and rebuild, develop cognition, motor language and social skills from work at home with the support of the family. Taking into account these methods, it is important in remote education to use motor games as a basic activity in the life of schoolchildren, because it can be an effective learning tool under the guidance of teachers and family members.

In this sense, motor games are an alternative for the physical development of children, as well as stimulating kinesthetic intelligence, which in essence can be transformed into such dynamic incentives. [López \(2000\)](#) emphasizes that games are pleasurable activities in which people engage to entertain themselves for an uncertain period of time. Therefore, teachers must understand the importance of game-based dynamics at home for students, since, through them, students develop physical, intellectual, emotional, and social. The immediate priority is to implement adaptations of the games to be developed at home autonomously and with the help of family members. It is assumed that the games are conducive to the development of kinesthetic intelligence, because they stimulate knowledge and respect for the body, discovery of the senses.

It is important to point out that the acquisition and development of psychomotor habits and skills should be promoted to be practiced at home due to the pandemic context. On the other hand, this contributes to the promotion of a culture of motor play and to the improvement of the student's physical, mental and social health. This ensures the acquisition and formation of knowledge and values, which allows the use of free time in reduced spaces and with biosafety standards to promote the quality of social life.

## CONCLUSIONS

Conclusively, this study demonstrates that in the context of the pandemic, Ecuadorian educational policies for a remote education have generated the adaptation of the areas of knowledge for a work by learning projects framed at home.

Physical Education has had to be transformed in terms of the use of appropriate teaching strategies that are capable of executing skills with prioritized performance criteria and that aim at the objective of the learning project. In particular, kinesthetic intelligence is considered to be transcendental in this process, because it has a significant impact on



the development of the students' intellectual capacity; either in their level of self-esteem and generation of autonomy towards motor play. It was demonstrated that the use of didactic strategies based on motor games can promote the stimulation of kinesthetic intelligence in students. This is due to the fact that this intelligence allows flexibility and adaptation of ludic activities in non-conventional spaces and without direct guidance from the teacher.

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**Conflict of interests:**

The authors declare not to have any interest conflicts.

**Authors' contribution::**

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