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Multiple Intelligences as a strategy for Physical Education: a didactic intervention during the pandemic

Inteligencias múltiples como estrategia para la Educación Física: una intervención didáctica durante la pandemia

Inteligências múltiplas como estratégia para a educação física: uma intervenção didática durante a pandemia

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ABSTRACT

The objective of this research is to know how the application of multiple intelligences, as a teaching strategy, affects the development of cognitive-motor skills and socio-affective attitudes in the subject of Physical Education during the pandemic. The approach of this study was quantitative-qualitative, with an experimental design. For this, a training workshop on multiple intelligences was proposed and applied, as a learning strategy, to a seventh grade Physical Education teacher in a private institution in the city of Quito, implementing this knowledge in parallel *A* classes as an experimental group. In the evaluation, it was observed that there is a better level of learning in this experimental group, compared to the control group. As a conclusion, it should be noted that Physical Education teachers should include multiple intelligences as a learning strategy in planning and evaluations due to the improvement in educational processes. This proposal allows cooperative work, integration and inclusion, in addition, it favors the rhythm and way of learning of students through the execution of cognitive, social, affective and motor activities. These intelligences improve learning and generate in students the autonomy of physical activity for life, in practice.

Keywords: Strategies; Multiple intelligences; Physical education; Didactics; Pandemic.

RESUMEN

El objetivo de esta investigación es conocer cómo afecta la aplicación de las inteligencias múltiples, a modo de estrategia de enseñanza, en el desarrollo de las capacidades cognitivo-motrices y las actitudes socioafectivas en la asignatura de Educación Física durante la pandemia. El enfoque de este estudio fue cuantitativo- cualitativo, con un diseño experimental. Para esto, se propuso un taller de capacitación sobre inteligencias múltiples y se le aplicó, como estrategia de aprendizaje, a un docente de Educación Física de séptimo grado en una institución privada de la ciudad de Quito, implementando este conocimiento en las clases del paralelo *A* como grupo experimental. En la evaluación, se observó que existe un mejor nivel de aprendizaje en este grupo experimental, en comparación con el grupo de control. Como conclusión, se debe señalar que los docentes de Educación Física deben incluir las inteligencias múltiples como una estrategia de aprendizaje en las planificaciones y evaluaciones debido a la mejora en los procesos educativos. Esta propuesta permite el trabajo cooperativo, la integración y la inclusión, además, esto favorece el ritmo y la forma de aprender de los estudiantes a través de la ejecución de actividades de tipo cognitivas, sociales, afectivas y motrices. Estas inteligencias mejoran el aprendizaje y generan en los estudiantes la autonomía de la actividad física para la vida, en la práctica.

Palabras clave: Estrategias; Inteligencias múltiples; Educación Física; Didáctica; Pandemia.

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RESUMO

O fim desta investigação é descobrir como a aplicação de inteligências múltiplas, como estratégia de ensino, afecta o desenvolvimento de competências cognitivo-motoras e atitudes sócio afetivas no tema da Educação Física durante a pandemia. A aproximação deste estudo foi quantitativa-qualitativa, com um desenho experimental. Para este efeito, foi proposta uma oficina de formação sobre inteligências múltiplas e aplicada como estratégia de aprendizagem para um professor de Educação Física do sétimo ano de uma instituição privada na cidade de Quito, implementando estes conhecimentos em aulas paralelas A como um grupo experimental. Na avaliação, observou-se que existe um melhor nível de aprendizagem neste grupo experimental em comparação com o grupo de controlo. Em conclusão, é de notar que os docentes de Educação Física devem incluir múltiplas inteligências como estratégia de aprendizagem no planeamento e avaliações devido à melhora dos processos educativos. Esta proposta permite o trabalho cooperativo, integração e inclusão, bem como favorecer o ritmo e a forma de aprendizagem dos estudantes através de atividades cognitivas, sociais, afetivas e motoras. Estas inteligências melhoram a aprendizagem e geram nos estudantes a auto segurança da atividade física para a vida, na prática.

Palavras-chave: Estratégias; Inteligências Múltiplas; Educação Física; Didática; Pandemia.

INTRODUCTION

The Ecuadorian government suspended classes in March 2020 in all educational institutions in the country, due to the state of emergency caused by the Covid-19 (Executive Decree No. 1017, 2020), the return to classes was in May of this year, to a so-called remote education, which consisted of virtual and distance education. This caused a real transformation in education; teachers had to adapt quickly to these new changes through the use and application of information and communication technologies (Posso Pacheco *et al.,* 2021a).

Physical Education, being an eminently practical subject, had to adapt to this form of teaching, contextualizing and innovating the active methodologies to its reality, i.e., it had to adapt several times in accordance with the permanent changes in educational policy throughout this process, due to the permanent structuring of pedagogical cards.

At the same time, the teaching role had to be aligned towards the orientation and guidance of the student so that he/she could acquire knowledge through the discovery and construction of playful, gymnastic, expressive-communicative and sports activities, being the protagonist of his/her own understanding from the motor, social, affective and cognitive aspects (Posso Pacheco, 2018).

This remote education was characterized by an approach to the needs of students, in other words, educational continuity was achieved for students who did not have connectivity and electronic devices (Marcillo Ñacato *et al.,* 2021), through the delivery of printed pedagogical cards so that all students had access to education, in many cases, delivered by teachers directly to their homes (Posso Pacheco *et al.,* 2021b).

The methodology used by the Ecuadorian Ministry of Education to address the pandemic was project-based learning with an emphasis on the interdisciplinary nature of all areas of knowledge, through pedagogical cards aimed at a monthly objective, which allowed students to acquire significant learning for life (Condor Chicaiza *et al.,* 2021).

This learning was based on projects adapted to the context and the reality lived by the entire educational community, in accordance with the various problems generated by the pandemic, with the sole purpose of generating learning autonomy (Condor Chicaiza *et al.,* 2021). In this sense, Nadal Vivas (2015) mentions that multiple intelligences contribute to the participation and autonomy of students inside and outside the educational institution, regardless of the different contexts and realities.

For his part, Gardner (1999) confirms that it is necessary to raise the potential of the student because everyone has, at least, 8 intelligences developed to a greater or lesser degree and that directly affect their way of learning, so individualized teaching methodologies should be proposed to the needs and requirements of each student.

This theory allows understanding intelligence as the capacities that people can develop from practice for the resolution of problems that will appear throughout life; Gardner (1987) mentions that intelligences can be approached during the school period through methodologies, it is worth considering that the motivation for this is the context in which learning is conceived, activating multiple opportunities to be able to understand from their possibilities.

The development of multiple intelligences during the application of the project-based learning methodology allows the design of different strategies to diversify the interdisciplinary curricular contents. It is stated that multiple intelligences are the pillars of project-based learning because knowledge is acquired to solve problems through the construction of interdisciplinary products, approaching the reality lived by students.

To develop diagnoses concerning the topic, sources that have provided much help in the application of instruments or research methods have been consulted (McMillan, *et al.,* 2005; Álvarez, 2017; González-Cutre; Lleixà, 2017; Chiva-Bartoll 2018; Aguado, Pastor, 2018; Martín, 2019; Skjong and Wentworht, 2000).

The objective of this research is based on the above, which is to know how the application of multiple intelligences, as a teaching strategy, affects the development of cognitive-motor skills and socio-affective attitudes in the subject of Physical Education during the pandemic. For this purpose, the following hypothesis is proposed: multiple intelligences applied as a teaching strategy improve the acquisition of motor, cognitive, social and affective learning.

MATERIALS AND METHODS

The approach of this study was quantitative-qualitative, with an experimental design; the research aimed to know how the application of multiple intelligences, proposed as teaching strategies, affects the performance of students in the seventh year of General Basic Education [EGB in Spanish], intermediate sub-level in the subject of Physical Education.

The observation technique was used to collect information through the progressive recording of behaviors instrument, in which the evaluation indicators were 0=not obtained, 1=in process with support, 2=in process without support and 3=achieved. Two variables were established in this research: cognitive motor development and socio-affective development (Table 1) and (Table 2).

Table 1. - Research variable cognitive motor development

Variable	Item	Description
Cognitive-motor development	Linguistic Intelligence	Ability to write, explain, relate all physical activities presented in class.
	Logical-mathematical intelligence	Ability to record and sequence time, distance and repetitions of all physical activities in class.
	Space Intelligence	Ability to graph the sequencing of time, distance and repetitions of all physical activities presented in class.
	Musical Intelligence	Ability of rhythmic synchrony between sounds emitted by different parts of the body and all the physical activities proposed in class.
	Naturalistic Intelligence	Ability to build and work with recycled material in each physical activity proposed in class.

Table2. - Socio-affective development research variable

Variable	Item	Description
Socio-affective development	Interpersonal Intelligence	Leadership attitude in all physical activities proposed in class.
	Intrapersonal Intelligence	Attitude to self-evaluate after each physical activity proposed in class.

The instrument was validated by the judgment of five experts by coincidence under the criteria of experience, recognition and disposition in a single circulation, because the Aiken V coefficient had a confidence interval of 1 in the parameters of relevance, clarity and objectivity (Table 3).

Table 3. - Mean, standard deviation, coefficient of variation, Aiken's V and confidence interval in instrument validation: relevance, clarity and objectivity

Item	Validation: relevance, clarity and objectivity			
	Media	CV (%)	V Aiken	CI (99%)
Linguistic Intelligence: write, explain, and retell all the physical activities proposed in class.	5,00 ±0,00	0	1	0,86 - 1,00
Logical-mathematical intelligence: recording and sequencing time, distance and repetitions of all physical activities proposed in class.	5,00 ±0,00	0	1	0,86 - 1,00
Spatial Intelligence: graphing the sequencing of time, distance and repetitions of all physical activities proposed in class.	5,00 ±0,00	0	1	0,86 - 1,00
Musical Intelligence: rhythmic synchrony between sounds emitted by different parts of the body and all physical activities proposed in class.	5,00 ±0,00	0	1	0,86 - 1,00
Interpersonal Intelligence: Each student must lead physical activities planned in class.	5,00 ±0,00	0	1	0,86 - 1,00
Intrapersonal Intelligence: after each physical activity proposed in class, self-evaluation should be performed.	5,00 ±0,00	0	1	0,86 - 1,00
Naturalistic Intelligence: Each physical activity proposed in class should be constructed and worked with recycled material.	5,00 ±0,00	0	1	0,86 - 1,00

In January 2021, at the end of the first quarter, a training workshop on multiple intelligences and its application as a learning strategy was given to the Physical Education teacher in charge of the seventh basic level parallel A and B of a private educational institution in the city of Quito.

The sample was a non-probabilistic sample by convenience, directed to the 48 parallel seventh grade EGB students A (n=24) experimental group and B (n=24) control group. Before collecting the information, approval was obtained from the authorities and teachers of the educational unit and informed consent was signed by the legal representatives of each of the students.

The study was conducted during the 2020-2021 school year of the Sierra-Oriente cycle; the first collection of information was carried out in the last week of January, before the beginning of the first quarter, and the second was carried out at the end of the second quarter, at the end of June.

The implementation of the multiple intelligences proposed as teaching strategies was given in the subject of Physical Education during the entire second quarter to the students of the seventh year of EGB parallel A, keeping the students of the seventh year of EGB, parallel B, regular teaching strategies.

To determine the level of performance between parallel A, the experimental group, and parallel B, the control group, the Mann Whitney U test was applied, with which the samples were placed in ascending order and ordinal ranges were assigned to compare the differences.

RESULTS AND DISCUSSION

In the pre and post evaluations of parallel A, an increasing mean is observed in the post evaluation. In relation to parallels A and B, it can be observed in the post evaluation that the variables of parallel group A, where multiple intelligences were applied as a teaching strategy, have a higher mean compared to parallel group B (Table 4) and (Table 5).

Table 4. - Descriptive statistics pre and post parallel group A

Variables	Media	Mode	Median	Standard deviation
Linguistic pre-intelligence	2.57	2	3	0.728
Linguistic post-intelligence	2.96	3	3	0.706
Logical-mathematical pre-intelligence	2.11	2	2	0.658
Logical-mathematical post-intelligence	2.42	2	2	0.507
Spatial pre-intelligence	2.48	2	2	0.846
Space post-intelligence	3.09	3	3	0.793
Musical pre-intelligence	2.70	4	4	1.105
Musical post-intelligence	3.43	4	4	0.728
Naturalistic pre-intelligence	2.30	2	2	0.635
Naturalistic post-intelligence	2.78	3	3	0.795
Interpersonal pre-intelligence	2.83	3	3	0.767
Interpersonal post-intelligence	3.0	3	3	0.905

Intrapersonal pre-intelligence	2.70	4	4	1.105
Intrapersonal post-intelligence	3.22	3	3	0.736

Table 5. - Descriptive statistics pre and post of parallel group B

Variables	Media	Fashion	Median	Standard deviation
Linguistic pre-intelligence	2.47	3	3	0.612
Linguistic post-intelligence	2.57	2	3	0.728
Logical-mathematical pre-intelligence	2.43	3	3	0.662
Logical-mathematical post-intelligence	2.47	3	3	0.612
Spatial pre-intelligence	2.91	2	2	0.596
Space post-intelligence	2.96	3	3	0.767
Musical pre-intelligence	2.78	3	3	0.795
Musical post-intelligence	2.96	3	3	0.767
Naturalistic pre-intelligence	2.48	2	2	0.846
Naturalistic post-intelligence	2.79	2	2	0.976
Interpersonal pre-intelligence	2.21	2	2	0.419
Interpersonal post-intelligence	2.47	3	3	0.612
Intrapersonal pre-intelligence	2.79	2	3	0.976
Intrapersonal post-intelligence	2.95	2	2	0.780

In order to know the difference in performance, depending on the application of multiple intelligences as a teaching strategy between the parallel experimental group A and the parallel control group B, the contrast statistic called Mann-Whitney U test was applied for the samples, with a confidence level of 95 % (Table 6).

Table 6. - Mann-Whitney U contrast statistic parallel group A vs. parallel B

Variables	Mann-Whitney U	Bilateral asymptotic sig.	Decision on null hypothesis
Linguistic intelligence	109	0.002	Rejected
Logical-mathematical intelligence	110	0.002	Rejected
Spatial intelligence	108	0.002	Rejected
Musical intelligence	128	0.015	Rejected
Naturalistic intelligence	109	0.002	Rejected
Interpersonal intelligence	95	0	Rejected
Intrapersonal intelligence	110	0.002	Rejected

Table 6 shows the results of the Mann-Whitney U test and the bilateral critical level, highlighting that if the bilateral critical level is less than or equal to 0.5, the null hypothesis is rejected in all variables, i.e., there is a large difference between the parallel experimental group A in which multiple intelligences were applied as a teaching strategy, with the parallel control group B in which the regular methodology was applied on the performance of all variables.

The research shows a significant improvement in the performance of students where multiple intelligences were applied as a teaching strategy in all the variables foreseen. The approach to Physical Education from the motor, social, affective and cognitive in equal percentages favors learning for life, where the student is considered as a being who must develop his/her eight multiple intelligences at different levels to integrate and contribute positively to society (Posso Pacheco, 2018).

It can be said that parallel group B, which continued with the application of the regular methodology, could not improve its levels of cognitive-motor and socioaffective development because it could not experience learning from different aspects, in which only the motor aspect was worked on as the axis of knowledge, leaving aside the interaction with the seven remaining intelligences.

It can be understood that students learn in different ways depending on their pace and type of learning, giving teaching strategies a major role during the pandemic, in which the student is seen as the center of learning. In this sense, Gardner (1998) says that permanent stimulation is necessary through different activities aimed at the same learning.

CONCLUSIONS

In conclusion, it should be noted that Physical Education teachers should include multiple intelligences as a learning strategy in planning and evaluations, because the student is more integrated in the teaching-learning process through cooperative, collaborative, integral and inclusive work.

As they are the center of learning, their rhythm and way of learning is regulated through the execution of cognitive, social, affective and motor activities, improving learning and generating in them autonomy in the practice of physical activity for life.

The implementation of multiple intelligences as a teaching strategy in Physical Education classes will improve the student's motor, cognitive, social and affective performance.

This improvement will be from the linguistic, by having the ability to write, explain, and relate all the activities proposed; from the mathematical logic, by having the ability to record and sequence the time, distance and repetitions of all activities; from the spatial, by having the ability to graph the sequencing of time, distance and repetitions of all activities; from the musical, by having the ability to synchronize rhythmically between sounds emitted by different parts of the body and all activities; from the natural, by having the ability to build and work with recycled material.

But also, from the interpersonal aspect, he/she will improve his/her leadership attitude, organization and peer mediation and, from the intrapersonal aspect, he/she will improve his/her attitude to self-evaluate after each activity performed, which will allow him/her to understand his/her corporeality and raise questions that will lead him/her to acquire research skills to reach the discovery.

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Conflict of interest:
The authors declare that they have no conflicts of interest.

Authors' contribution:

Richar Jacobo Posso Pacheco: Conception of the idea 100 %, search and review of literature 80 %, preparation of instruments 80 %, application of instruments 80 %, collection of information resulting from the instruments applied 80 %, statistical analysis 80 %, preparation of tables, graphs and images 80 %, preparation of database 100 %, general advice on the subject matter addressed 90 %, correction of the article 70 %, authorship coordinator 100 %, translation of terms or information obtained 70 %, review of the application of the bibliographic standard applied 70 %.

Shirley Patricia Villarreal Armas: Literature search and review 10 %, application of instruments % 5, collection of information resulting from the applied instruments % 5, statistical analysis % 5, preparation of tables, graphs and images % 5, correction of the article % 5, translation of terms or information obtained % 5, review of the application of the bibliographic standard applied % 5, revision and final version of the article % 50.

Josue Celso Marcillo Ñacato: Search and review of literature 10 %, application of instruments %5, compilation of information resulting from the instruments applied % 5, statistical analysis % 5, preparation of tables, graphs and images % 5, correction of the article % 5, translation of terms or information obtained % 5, review of the application of the bibliographic standard applied % 5, revision and final version of the article % 50.

Pablo Fabián Carrera Toapanta: Literature search and review % 5, preparation of instruments % 5, application of instruments % 5, compilation of information resulting from the instruments applied % 5, general advice on the subject matter addressed % 5, correction of the article % 5, translation of terms or information obtained % 5, review of the application of the bibliographic standard applied % 5, writing of the original (first version) 50 %.

Nora Elizabeth Morales Pérez: Literature search and review 5 %, preparation of instruments 5 %, application of instruments 5 %, compilation of the information resulting from the instruments applied 5 %, general advice on the topic addressed 5 %, correction of the article 5 %, translation of terms or information obtained 5 %, review of the application of the bibliographic standard applied 5 %, writing of the original (first version) 5 0 %.

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