

PODIUM

Journal of Science and Technology in Physical Culture

Volume 19
Issue 1

2024

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








Translated from the original in Spanish

Original article

Digital competencies of Physical Education teachers to reduce student stress through project-based entrepreneurship

Competencias Digitales de docentes de Educación Física para reducir el estrés de estudiantes mediante emprendimiento en proyectos

Competências digitais dos professores de Educação Física para reduzir o estresse dos alunos por meio do empreendedorismo baseado em projetos

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Received: 10/25/2023.

Approved: 01/09/2024.



ABSTRACT

Entrepreneurship in physical activity and sports projects, above all, has proven to be attractive and healing, par excellence. This situation is very notable in individuals who spend a large part of their time sitting in front of a computer, as is the case of students in training who develop digital skills. In this work, the need to investigate the relationship between the work carried out by these students and the health problems generated by the long hours they invest in their work linking with digital skills was considered; therefore, the objective was to determine what are the fundamental causes that cause stress in computer science students and to what extent the physical activity they perform helps them reduce these impacts of professional activity. To achieve this, empirical level methods such as scientific observation, interviews and surveys were applied. As preliminary results, from a pre-experiment, it was confirmed that the students perceived a satisfactory change, with lower levels of stress and improvements in postural behaviors.

Keywords: postural behaviors, physical exercise, stress.

RESUMEN

Los emprendimientos en proyectos de la actividad física y el deporte, ante todo, han demostrado ser atractivos y curativos, por excelencia. Es muy notable esta situación en individuos que invierten gran parte de su tiempo sentados frente a un computador, como es el caso de los estudiantes en formación que desarrollan competencias digitales. En este trabajo, se consideró la necesidad de investigar la relación existente entre la labor que realizan estos estudiantes y los inconvenientes para la salud que generan las prolongadas horas que ellos invierten en su trabajo de vinculación con las competencias digitales; por lo que el objetivo consistió en determinar cuáles son las causas fundamentales que provocan el estrés en estudiantes de informática y en qué medida la actividad física que realizan les ayuda reducir estos impactos de la actividad profesional. Para lograrlo, se aplicaron métodos del nivel empírico como la observación científica, la entrevista y la encuesta. Como resultados preliminares, a partir de un preexperimento, se pudo constatar que los estudiantes



percibieron un cambio satisfactorio, con niveles inferiores de estrés y mejoras de los comportamientos posturales.

Palabras clave: comportamientos posturales, ejercicio físico, estrés.

RESUMO

O empreendedorismo em projetos de atividade física e esportivos, sobretudo, tem se mostrado atrativo e curativo, por excelência. Esta situação é muito notória nos indivíduos que passam grande parte do seu tempo sentados em frente ao computador, como é o caso dos alunos em formação que desenvolvem competências digitais. Neste trabalho foi considerada a necessidade de investigar a relação entre o trabalho realizado por esses alunos e os problemas de saúde gerados pelas longas horas que investem no seu trabalho vinculando-se às competências digitais; Portanto, objetivou-se determinar quais são as causas fundamentais que causam estresse em estudantes de informática e em que medida a atividade física que realizam os ajuda a reduzir esses impactos da atividade profissional. Para conseguir isso, foram aplicados métodos de nível empírico, como observação científica, entrevistas e pesquisas. Como resultados preliminares, de um pré-experimento, confirmou-se que os alunos perceberam uma mudança satisfatória, com menores níveis de estresse e melhorias nos comportamentos posturais.

Palavras-chave: comportamentos posturais, exercício físico, estresse.

INTRODUCTION

More and more people intend to undertake physical preparation projects, without having a business plan that can safely achieve their goals, because only a small percentage of entrepreneurship projects meet their objectives. Before launching a product or service, its viability must be evaluated from a realistic perspective and the resources available for its realization must be considered. Therefore, it is necessary to review readings on business learning, in physical preparation projects to reduce stress.



For a long time, the European Union has proposed, in its regulations, to promote entrepreneurship from the first beginnings of the school stage to university studies (Sánchez-Torné *et al.*, 2021), especially in projects linked to health, both physical and that achieve a reduction in stress, which can be linked to the development of digital skills.

Finland, according to the latest scope of (Global Entrepreneurship Monitor 2021/2022), occupies one of the first places with 6.09%, in demonstrating success in the entrepreneurship of projects that link business training with basic education. One of the characteristics of this venture is that it includes projects associated with education and physical preparation.

The new educational provisions, both national and international, allow and favor the insertion of entrepreneurship projects in the educational system; for this reason, this approach is already beginning in Latin America and although it lacks financial benefits, it creates significant social impacts (Ibáñez, 2021).

Enterprises linked to sports and physical activity are considered by the local community as an instrument of high value to transform society and directly imply, due to their level of participation, the full development of individuals, in addition to the aspect of socialization (Ramírez, *et al.*, 2004).

There are theoretical approaches that indicate that physical exercise can reduce the negative impacts on emotional states such as anxiety, depression and stress; they contribute to improving intellectual and cognitive abilities and generate functional changes through the practice of physical activity and sports.

All of this leads to state that sporting activity becomes a primary element to activate health promotion programs in favor of children and adolescent populations without specific pathologies, including irregularities in learning, symptoms of hyperactivity, some cases of mental deficiency and dissocial behavior (Ramírez *et al.*, 2004).

In training centers associated with Information and Communications Technology (ICT), such as the University of Computer Sciences, in Havana, Cuba, the necessary time is not dedicated to practicing physical activity and sports; it is based on the premise that students spend a prolonged period of time in front of computers during the course and problems



arise in adopting postures. In this context, the practice of physical exercises is carried out spontaneously, so it is necessary to carry out additional physical and educational activities to contribute to the prevention of occupational diseases (Márquez, *et al.*, 2014) and it is considered necessary to develop physical exercises focused on strengthening the muscles. (Márquez *et al.*, 2014).

The times of COVID-19 boosted the worldwide need to exercise physical activity to avoid sedentary lifestyle, obesity and induced autism problems that could be caused by excessive hours in front of television and the computer.

There are statistics from studies applied in the United States that corroborate how, in the case of children, access to physical activities at school such as Physical Education, recess and walking was reduced. Youth sports leagues canceled all training and games in most North American states; likewise, gymnastics, dance and martial arts classes for young people were also affected and crowds were prohibited in public, federal, state and local parks.

Likewise, leisure centers, playgrounds, trails and beaches were closed in many jurisdictions. It is very possible that these social isolation measures implemented have decelerated the spread of COVID-19, but also, as a side effect, children's ability to engage in physical activity at sufficient levels to maintain health and prevent illness was limited.

In this study, three-quarters of American children and youth ages 6 to 15 did not meet the guideline recommendation of at least 60 minutes of moderate to vigorous physical activity per day. Additionally, nearly half of American children and youth ages 6 to 11 spend two or more hours a day in front of a screen, a level of behavior higher than the levels recommended by the American Academy of Pediatrics.

Insufficient physical activity and excessive sedentary behavior among children represents a major problem because healthy behavioral patterns in childhood are likely to persist into adulthood and may lead to an increased risk of a number of serious diseases (for instance, overweight/obesity, type II diabetes, and metabolic syndrome) in later childhood and adulthood (Dunton, *et al.*, 2020).



On the other hand, in this digital competence-physical activity relationship, not only have research on therapies to remedy prolonged disorders caused by an extended position in front of the computer been relevant, but also from the digital devices that have been created to sustain a developing session of physical activity.

To achieve this contribution, the products are combined with the use of applications for smartphones and computers. These can help users, through a series of motivation and monitoring tools, to manage not only their condition, but also improve personal health, since among other services these devices have the potential to provide specific and personalized information, through algorithms specifically designed by health professionals.

This type of emerging technology may provide an alternative means of providing ongoing support and motivation to people who wish to increase or maintain their activity levels following a structured lifestyle intervention. These wearable, consumer-based activity tracking resources can also help reduce the time and resource burden associated with traditional methods of ongoing support.

Randomized controlled trials have shown that these devices show promise in increasing physical activity participation. However, the number of participants in individual studies tends to be low, making it difficult to properly evaluate their benefits. Furthermore, research regarding its long-term adherence and effectiveness is limited (Brickwood, *et al.*, 2019).

The application of new technologies in Physical Education necessarily implies the inclusion of digital competence in the classroom; digital competence understood as one of the basic competences of the compulsory education curriculum. For this reason, Physical Education teachers assume that digital competence is not simply a technological or technical-instrumental skill, but rather contributes to transcending the simple management of information or technological tools and is necessarily composed of other knowledge, dimensions and skills, both personal and social.

With the inclusion of ICT in the field of Physical Education, teachers have the possibility of organizing and programming more attractive teaching units, something that not only benefits the students, but the entire educational community. Thus, teachers are able to



adequately combine the use of ICT with the methodological requirements of Physical Education, to create new perspectives and satisfy educational needs; however, the use of digital competence can convert the activities carried out in the Physical Education classroom into sedentary ones, by reducing motor commitment and reducing the recreational and social attractiveness of the subject (Martínez-Rico, *et al.*, 2021).

Digital technology in school has become an influential strategy for teachers to use them to support their pedagogical practices and student learning. However, it is important to note that the use of technology without the intention of facilitating learning does not enrich the educational experience. In fact, the main findings on technology-based interventions, online and combined, in Physical Education, found that it is mainly used to improve health or motivation variables, but not the learning outcomes of the subject curriculum.

From the information provided, it is clear that from a theoretical point of view the aforementioned authors agree that prolonged time in front of computers and other ICT devices harms the health of students, especially computer science students. For this reason, and to confirm this hypothesis about the role of physical activity and sport as a therapeutic method to reduce stress in these students, the objective is to determine what are the fundamental causes that provoke stress in computer science students and in to what extent the physical activity they perform helps them reduce these impacts of professional activity.

MATERIALS AND METHODS

To corroborate this hypothesis, a diagnosis was established supported by the application of the survey to students, interviews with teachers and scientific observation applied to 10 classes. The sample was made up of 50 Regular Basic Education students who plan to continue studies related to computing in Lima, Peru, and five teachers who teach Physical Education to these students were interviewed.

In the scientific observation, mediated by a guide, the presence of physical activities was assessed. The average way students sit in front of the computer was also determined, as well as the times they alternate activities.



The interview was directed to five Physical Education teachers, with the objective of knowing if they conceive specific activities that help improve or rehabilitate the muscles that students in this specialty normally exercise the least.

The survey was aimed at the students, through which it was possible to know the state of opinion they have about their cognitive activity in front of the computer, the presence of stress resulting from it and the presence or absence of physical activity to mitigate the impacts of the long hours in front of their digital electronic devices.

Once a group of physical exercise sessions has been implemented to reduce the stress resulting from long hours at the computer, a pre-experiment is applied to empirically validate these results. The research was developed with a quantitative approach, analytical type and quasi-experimental design, with pre-test and post-test in the same group. The Test was made up of seven questions about stress (applied in Peru by Palomino (2021), adapted in Chile by Román, *et al.*, 2008)

The inclusion criterion was to consider the students who were willing to answer said questionnaire when they began their in-person studies in 2023.

The following established weights were considered for each alternative: Never =1, Sometimes =2, Many Times =3 and Always =4, for each item. The information obtained was processed in an Excel program database, the results were presented in tables. The normality test was done with the IBM-SPSS 20.0 statistical program; then, the mean difference test was done using the *student`s T statistic*.

The null (Ho) and alternate (Ha) hypothesis test; with a significance ≤ 0.05 :

- Ho: There is no significant difference between the scores obtained before and after the sports Olympics week at the educational institution.
- Ha: There is a significant difference between the scores obtained before and after the sports Olympics week at the educational institution.



The information from the pre-test and post-test questionnaires was collected and processed after the first week of November 2023.

RESULTS AND DISCUSSION

Description of initial diagnosis results

Scientific observation: in the ten classes visited, it was possible to perceive that accompanying physical activities are not contemplated before, during or after the students' contact with their computers. The average way in which students sat to work at the computer was incorrect, in many cases an advantageous position for the physical arrangement of the spine was not preserved.

Likewise, it was observed that the students reclined incorrectly in their chairs, in search of comfort and in general, they did not alternate activities of any kind with the activity linked to the exercise of computing, except going out to ask for some consultation or personal management. There were no physical activities or entertainment that could combat the stress resulting from this type of work.

Interview: through this method it was possible to verify that Physical Education teachers do not contemplate in their methodological preparations any type of activity that develops the muscles most used in the computer activity. This shows that it must be worked more on the professionalization of Physical Education, for this specialty.

Survey: From this method it was determined that students feel tired and fatigued at some point during the day, even though they are passionate about and motivated by this activity, since 80% chose it as their first option. They propose in this instrument that it would have been very convenient to have physical activities, games or sports at different moments of training.



Methodological triangulation: After analyzing the results of these methods, the following preliminary conclusions have been reached.

- All methods agree that the recreational and physical activities that accompany the work day in front of the computer are not taken into consideration. Situation that affects the psychological health of students and teachers.
- In the observation and interview, it is agreed that the Physical Education teachers do not adjust the contents to the professionalization of the computer science degree (there is no presence of physical activities that help relieve the stress of the work day, as well as to develop the muscles involved in this type of profession)

The scores of the pre-test and post-test applied previously, in similar research in Peru by Palomino, adapted in Chile by Román *et al.* (2008) have been recorded in Table 1, shown below (Table 1).

Table 1. - Pre-test and Post-test to measure self-control for stress management (before and after applying the selection of proposed exercises)

Test items to measure stress	Pretest	Posttest
1. It took me a lot to calm down	124	101
2. I lost control in certain situations.	120	96
3. I felt like I was very nervous	102	103
4. I noticed that I was getting restless.	94	94
5. It became difficult for me to relax.	114	98
6. I couldn't stand it when something kept me from what I was doing all the time.	94	85
7. I felt like I was very irritable.	120	119
Average or arithmetic mean	109.7	99.4

Interpretation of table 1, in the first item, the highest score was reached in the pre-test, which corresponds to 124 points compared to the post-test score of 101. The lowest score in the pre-test is in item 7, corresponding to 94 points for item 4 and 5 with zero and small difference compared to the post test.



Inference from pre-experiment results

The Hypothesis Test was performed to determine if the difference in means (averages) was significant; with respect to a significance of 0.05; a "P value" was obtained for the *Student's T test*. of 0.046 less than 0.05, then the null hypothesis was rejected and the alternative hypothesis was approved:

There is a significant difference between the scores obtained before and after the sports Olympics week at the educational institution for a Sig of 0.05; that is, the difference in averages (109.7 and 99.4) was significant.

By taking stock of the results, it was possible to demonstrate the effectiveness of the proposed exercises to relieve stress in students, as well as the position they must maintain in front of the computers.

This research is based on the premise that the requirements currently presented to universities to maintain their international ranking are increasingly greater and of course, pressures, indications to be fulfilled that are constantly increasing fall on teachers. On the other hand, the work of Gutiérrez (2021) dedicated to reducing stress in students also stands out, but not from computer science, as reflected in the study presented here, but to students of pedagogical careers, where it is clear that the didactics of teaching is a beautiful and necessary profession, but very complex, since the human being is a combination of internal and external influences and therefore educating different characters and personalities entails a study, an effort that constantly creates stress in the profession.

In terms of trying to apply different physical exercises to relieve this professional stress, the work of Escobar *et al.* (2019), who uses the Yoga technique to reduce stress levels also in students, but in the health sector, could *not be missing as a reference*



CONCLUSIONS

In this work it was verified that physical and sports activity is a high-quality therapeutic alternative to combat stress and other disorders that affect the quality of life and human health.

Both the diagnostic results and the practical feasibility results demonstrated that the routine activity of a computer scientist needs to be complemented by physical activity to guarantee a high level of health in these individuals and, therefore, the impact of these exercises yielded satisfactory results according to the pre-experiment carried out.

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Conflict of interests:

The authors declare not to have any interest conflicts.

Authors' contribution:

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





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