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Methodology to motivate Sports Enthusiasts in Creating Their PPGarden from a solutionary conception

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Abstract: Taking advantage of arable spaces to guarantee healthy nutrition for citizens, and athletes in particular, is an urgent need and a global priority. **Objective:** To propose a methodology based on the concept of Solvers that transforms idle green areas into productive areas that provide healthy nutrients. **Methods:** A pedagogical test and scientific observation were applied. **Results:** These techniques demonstrate the limited knowledge students have on environmental issues related to their sports activities and, above all, related to the green areas of their institution. **Conclusions/contributions:** The Solvers methodology, transferred to the context of transforming the green areas of the sports educational center, empowers students in their search for solutions, develops their independence and creativity, and deepens their critical and strategic thinking.
Keywords: Methodology, motivate, sport, gardens, PPGarden, problem-solver.

Metodología para motivar a entusiastas del deporte a crear jardines PPGarden desde una concepción Solucionadora

Resumen: Aprovechar los espacios cultivables para garantizar una nutrición saludable a los ciudadanos, y a los deportistas en particular, es una necesidad urgente y una prioridad mundial. **Objetivo:** Proponer una metodología basada en el concepto de Solvers que transforme las zonas verdes ociosas en áreas productivas que aporten nutrientes saludables. **Métodos:** Se aplicó un test pedagógico y observación científica. **Resultados:** Estas técnicas demuestran el escaso conocimiento que tienen los estudiantes sobre temas ambientales relacionados con sus actividades deportivas y, sobre todo, relacionados con las áreas verdes de su institución. **Conclusiones/contribuciones**: La metodología Solvers, transferida al contexto de transformación de las áreas verdes del centro educativo deportivo, empodera a los estudiantes en su búsqueda de soluciones, desarrolla su independencia y creatividad, y profundiza su pensamiento crítico y estratégico .
Palabras clave: Metodología, motivar, deporte, jardines, PPGarden, solucionadora.

Metodologia para motivar entusiastas do desporto à criação dos seus jardins PPGarden a partir de uma concepção Solucionadora

Resumo: Aproveitar os espaços cultiváveis para garantir uma alimentação saudável aos cidadãos e, em particular, aos desportistas é uma necessidade urgente e prioritária a nível mundial. Objetivo: propor uma metodologia a partir da conceção de solucionadores que transformem áreas verdes ociosas e as tornem em áreas produtivas e portadoras de nutrientes saudáveis. Métodos: foi aplicado um teste pedagógico e uma observação científica. Resultados: Estas técnicas demonstram o fraco conhecimento dos alunos sobre as questões ambientais relacionadas com a sua vida desportiva e especialmente relacionadas com as áreas verdes da sua instituição. Conclusões: A metodologia Solver transferida para o contexto de transformação dos espaços verdes do centro desportivo pedagógico capacita os alunos na procura de soluções, desenvolve a sua independência, criatividade e aprofunda o seu pensamento crítico e estratégico.
Palavras-chave: Metodologia, motivar, esporte, jardins, PPGarden, solucionadora.

Méthodologie pour motiver les passionnés de sport à créer leur jardin PPGarden à partir d'une conception Solutionnaire

Résumé: Exploiter les espaces cultivables pour garantir une alimentation saine aux citoyens, et en particulier aux athlètes, constitue une nécessité urgente et une priorité mondiale. **Objectif :** Proposer une méthodologie fondée sur une approche de "Solutionnaires", visant à transformer les espaces verts inactifs en zones productives et sources de nutriments sains. **Méthodes :** Une épreuve pédagogique et une observation scientifique ont été mises en œuvre. **Résultats :** Ces techniques ont révélé la faible connaissance des étudiants concernant les enjeux environnementaux liés à leur vie sportive, et plus précisément à propos des espaces verts de leur établissement. **Conclusions/Apports :** La méthodologie des Solutionnaires appliquée à la transformation des espaces verts du centre pédagogique sportif permet d'autonomiser les étudiants dans la recherche de solutions, de développer leur indépendance, leur créativité et de renforcer leur pensée critique et stratégique.
Mots-clés : Méthodologie, motiver, sport, jardins, PPGarden, solutionneuse.

1. Introduction

One of the challenges to be solved in this 21st century is to increasingly reduce the gap between what is learned in academia and what is needed to solve the most pressing problems in the social sphere, especially those related to violence, racism, wars and environmental issues. For this reason, authors such as Weil (2012) projected in his work a model of student who is not only trained to acquire knowledge and skills in the sciences of knowledge, but also whose culture is used to solve problems of daily life, whether within the school, in areas outside of this center and in the community.
Once this need is understood, this problem-solving dimension is beginning to be strengthened in global curricula, primarily in an effort to foster a new generation that is more active and inclusive in government decisions, with a greater or lesser degree of impact depending on each nation. From this rise comes a concern not only with finding short-term solutions, but also with those that are sustainable over time and aimed at preserving balance and peace. (Amador, Morales, 2016)
Among the fundamental issues to be fostered in this type of humanistic education for social work is the urgency of engaging students in the construction of new spaces through their physical and cognitive activity. This premise must be gradually established so that the individual is capable of generating social transformations from within their sphere of action, through systematic participation and collaborative work (Bretzlaff-Holstein, 2018).

In the sports field, there are various aspects that need to be reviewed and perfected at the training level, especially so that the athlete knows and receives the necessary nutrition to perform in their practice and performance. (Denis, Rodríguez, 2019) In the case of Cuba, an island besieged for years due to an economic and financial blockade by the North American government, it has not been possible to guarantee each practitioner a balanced diet and it is there where the role of science and innovation have their fundamental role in taking advantage of green areas even with very limited technology and resources to produce food that keeps up with the new times.
It is in this context that it is also urgent to create methods that aim for a paradigm of healthy and alternative nutrition.
It seems simple when promoting this necessary campaign that the public sees through the media. However, in practice, it is very difficult to get athletes to prefer eating vegetables and fruits, understanding the sometimes limited availability of this type of food and wanting to participate in the cultivation of these natural products. (Saíz et al, 2020)
It would be very beneficial to support this premise to create self-funded gardens for sports centers where each training space displays a diagram of how healthy nutrition can help improve athletic performance (Qqueccaño & Rodríguez, 2022).

However, in general, more emphasis is placed on the intake of healthy foods such as vegetables when the athlete suffers from a disorder or illness, and this option is rarely considered a preventive health issue. (Manobanda & Villacís, 2024)
In recent years, due to the food shortage in Cuba, measures have been strengthened to encourage workers, athletes, and students who contribute in one way or another to the National Institute of Physical Education and Recreation (INDER). Programs associated with this objective include the Food Sovereignty Program, the Life Task Follow-up, and the 2030 Agenda, which align with the development goals.

These programs are not the only ones that have dedicated themselves to proposing initiatives to improve athletes' nutrition; others have also done so from sports training centers, using strategies developed by health and physical education professionals. One of them is PPGarden (Pretty and Productive Garden), an environmental movement within the Cuban sports sector that seeks, among its objectives, to transform idle areas into productive spaces through the participation, commitment, and responsibility of sustainable sports enthusiasts in each locality. The objective has been very clear since its founding on November 12, 2023 (Valladares et al., 2024). However, finding a methodology that can standardize the work across the country and, of course, that can motivate and channel

individuals to feel an interest in transforming these areas through teaching work in classrooms and sports facilities has been a pending task.

It is precisely in this context and in response to this need that the Solvers' methodological proposal is taken into consideration, transferred to the conditions presented in this study. If the objective is to foster this awareness of growing and consuming vegetables in high-performance athletes, it is very important to sustain these values from an early age through motivation and the guidance of a humanistic pedagogy (Goldman, 2021; Cochrane, 2023; Herwig, 2024).

These are the guidelines that allow us to establish the following objective **:** to propose a methodology based on the concept of Solvers that transforms the idle green areas of the sports center and converts them into productive areas that provide healthy nutrients for athletes.

2. Methodology

Eight students out of a total of 15 were used for the research. These students are from the second year of the Bachelor's degree in Physical Education. In addition to taking the Regular Daytime Course, they will also practice a sport during alternate hours from their teaching hours during the 2024-2025 academic year.

To conduct the diagnosis based on determining the level of knowledge students have regarding the concept of Solvers with a view to transforming the green areas of the pedagogical-sports garden into cultivable spaces in harmony with biodiversity and the ecosystem.

To this end, a pedagogical test (PT) was administered to the eight students, based on the indicators that a problem-solving program should follow, and an observation of the work session was conducted after the pedagogical test was completed. The observation will take into account the following aspects:

1. Level of motivation and interest in the topics to be discussed
2. Level of argumentation of the answers
3. Level of creativity and imagination in the answers offered
4. Level of call regarding the formation of a future team of Solvers.

The dimensions to be evaluated in the pedagogical test include the four phases that a Problem Solver must go through.

1. ID
2. Investigation
3. Innovation
4. Implementation

Specifically for each dimension, the different indicators will be investigated.

1a) Select a topic related to the school environment to discuss. (TME)

1b) Identify the problem to be solved in the context of the school environment. (IPR)

1c) Write a sentence problem and the guiding questions. (OPO)

2 a) Develop a deep understanding of the existing problem related to the improvement of this environment. (CPP)

2b) Compile the necessary information on the status of vacant green areas around the sports and educational center so that it can be used as a starting point for potential land transformation without harming the biodiversity that coexists in the area. (INS)

2c) Disseminate this information, especially to secure sponsorship and support for human, material, and technological resources. (SIP)

2 d) Explore similar experiences that have worked or not in this area of knowledge. What foundations could be built upon for this transformation. (EES)

3 a) Establishment and development of an ecological movement focused on the renovation of green areas from a productive and aesthetic perspective. (EDM)

3 b) Creation of methodologies that promote and direct an action plan in a novel way but that do not jeopardize the quality of life of the surrounding environment and its biodiversity . (CMI)

4 a) Implement an action plan that leads to the solution. (IPA)

4 b) Share the solution work with others. (CTS)

4 c) Evaluate, reflect on, and celebrate the results of the solution. (ERC)

Procedure regarding the application of the pedagogical test

First, the teacher or coach should explain to the students/athletes that the pedagogical test will be administered to determine their experiences and understandings of the problem-solving approach in the subjects they have taught. Students may have taken a subject with a particular approach to the problem-solving approach, especially in the natural sciences, such as compiling photographs of endangered species or participating in student campaigns to save electricity or water in the community, some promoted by the school, others by the local government. In any case, it is very important to have prior knowledge of the students' situation regarding this issue as part of the assessment.

To adapt these prompts to students' familiar vocabulary, the teacher will need to rephrase the questions in a language familiar to the students if necessary. Examples: EDM: Have you heard about any environmental movements in your school or community aimed at restoring neglected green areas? Explain your answer.

CMI: Have your teachers created initiatives to motivate you to transform a garden, or prune a tree without harming other species? Explain your answer.

The test can be oral or written, whichever suits the instructor best. However, it will be a challenge to be able to administer an oral pedagogical test while simultaneously observing any perceptible aspects that may be missing from the assessment. (PP)

Correct answers that meet more than 95% of the required accuracy will be graded as Good (B). Those that meet approximately 50% of the required content will be graded as Fair (R), and those that meet less than 40% of the required accuracy will be graded as Poor (M).

3. Results.

Table 1 - Results of the pedagogical test by Indicators

Eve.	1TME	1IPR	1OPO	2CPP	2INS	2SIP	2EES	3EDM	3CMI	4IPA	4CTS	4ERC
B	-	-	-	-	-	-	-	-	-	-	-	-
R	5	7	2	0	0	0	0	2	2	2	3	0
M	3	1	6	8	8	8	8	6	6	6	5	8

As can be observed, none of the answers provided by the students meet the condition of being correct, and regarding the quality of the evaluations, everything indicates that the phase where students are least familiar is the Investigation phase. This can be an important detail for the teacher, since it is here where more emphasis should be placed when creating an action plan to turn students/athletes into Solvers. The students' best performance is in the IPR indicator, since it is precisely on the objective of identifying the problem to be solved where all the students agree, and this is related to the green areas around the school, frequently underutilized and, in worse cases, converted into rubble dumps near the community.

3.1. Results of Scientific Observation

a. Level of motivation and interest in the topics to be discussed
   This level is evaluated as Good. Students have noticed that the school needs to improve its external appearance, especially in relation to the green areas, and they are very interested in knowing how they could contribute to its improvement from the role of students.
b. Level of argumentation of the answers.

Since there is limited knowledge on this topic, the answers are not broad or in-depth, they are limited to accepting or denying in each case and with very general examples that may be characteristic of any place in the territory.

c. Level of creativity and imagination in the answers offered
Very limited, due to a lack of information and methods to address these problems, critical and strategic thinking on these issues is also limited.

d. Level of call regarding the formation of a future team of Solvers.
The questions posed by the instructors, as well as the answers given by the students/athletes, create expectations among the students, who infer that after this test, an event must occur that will make them part of Solutions to the State of Green Areas.

3.2. *Summary proposal of the Methodology to transform green areas into productive spaces from a solution-oriented perspective.*

This work will also show images that accompany this methodology according to the objectives of each phase.

a. Identify

In this first one, the Iceberg model appears. Through this model, students, in the form of a brainstorming session, are motivated to determine the visible problems (the apex of the iceberg) and the problems that come from the root and that are not as visible as those on the surface, but it is important to take them into account if the objective is to eradicate them.

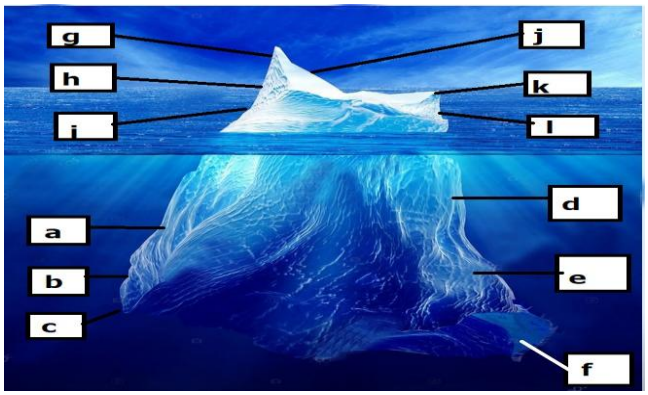

Figure 1. Iceberg model

b. Investigate

The image the instructor will bring to class will be related to the research process, that is, the search for information on the current situation in these areas so that possible solutions to the problem can be found.

Figure 2. Scanning images of the current state

c. Innovate

Through this methodological step, students will make proposals or designs, in such a way that they can respond to the existing problems in the green areas of the school, first from a perspective of testing, coordination, planning and deployment of critical and strategic thinking.

Figure 3. Design, make proposals with the help of experts and the team.

d. Implement

Implement the transformation through a pre-planned and organized action plan that encompasses land preparation, fertilization, planting, protection, and irrigation, all the way to maintaining optimal crop conditions. The ecosystem in the area must also be improved, and the results must be celebrated and enjoyed, and the lessons learned must be shared.

Figure 4. Establish an action plan, enjoy the results and socialize it

4. Discussion

This work addresses the need to restore the physical condition of the green areas at a sports education center and take advantage of the vacant land available to provide nutritious and healthy food to student athletes and staff who attend the center. The initiative is based on a scientific study that involves a technology transfer from the problem-solving program currently promoted globally by the Institution for Human Education. Some similarities and differences with previous studies can be described.

For example, we agree with Weil, (2019); Goldman, (2021) because in both cases the participation of students is involved in the search for solutions to problems through science. However, this context is more general, the problems that arise come from different origins, it is very difficult to make them sustainable over time because a precise methodological treatment is required and not the construction of a space and an exchange of roles as already described in this work. Furthermore, in contrast to Chávez, et al. (2023), they mention digital skills and their application for obtaining learning in the post-Covid-19 era.

Anyanwu, (2019); Herwig, (2024); are closer to matching the present work because in addition to using a Solver platform, they also promote leadership, creativity, independence, and integration of technology in students.
Garnett, (2024) contributes a little more above these aforementioned characteristics that he also shares with this study and is the fact of developing in students critical thinking in a contextual language in favor of peace and justice and balance on the planet.

In line with Núñez-Naranjo et al. (2023), it is highlighted that encouraging research within the teaching framework fosters the adoption of healthy eating practices, which supports the idea of converting idle areas into productive spaces. The methodology presented here is articulated with the proposal to promote adequate nutrition within the educational environment, emphasizing the active participation of students as agents of change.

In addition to Rojas & Ugaz (2024), strategic planning and organizational management of human potential are important for planning sports activities and managing stress; as well as with Chávez et al. (2023), allowing the understanding of digital competencies and their application to obtain learning.
Likewise, Villegas-Flores (2023) provides insights into the importance of considering gender concepts and school coexistence in shaping the learning climate. This underscores the need for inclusive strategies that contribute to a participatory and respectful environment. The use of Solvers in the PPGarden is thus proposed as a way to consolidate an educational environment that integrates nutritional and social dimensions, impacting students' comprehensive development.

5. Conclusions

The proposal presented here draws on the best of its predecessors, drawing on benchmarks that point to a program of problem-solvers that engages student athletes with the socio-environmental problems of today's reality, doing so from a critical, strategic, and humanistic perspective.
The diagnosis confirms that, although the students in the study are clearly interested in the topic of the critical situation of their school's green spaces, their limited knowledge and the lack of a problem-solving approach in their curriculum prevent them from participating in the transformation of their school and extracurricular environments.
This methodological proposal provides an organized path to facilitate the transformation of idle areas into productive spaces through a solution-oriented lens. It emphasizes the coordination of alliances, teamwork, and systematization of work and research.

References

Amador, L.M.G., & Morales, L.A. (2016). Educating for a culture of peace. *Colombian Psychology Review*, 19(2), 347–348. https://actacolombianapsicologia.ucatolica.edu.co/index.php/acta-colombiana-psicologia/article/view/1137

Anyanwu, K. (2019). Making Sense of New Technology Integration Frameworks in 21st Century Teacher Education Program. In EdMedia+ Innovate Learning (pp. 545-551). *Association for the Advancement of Computing in Education* (AACE)

Bretzlaff-Holstein, C. (2018). The case for humane education in social work education. *Social Work Education*, 37(7), 924-935. https://www.researchgate.net/publication/280385667_Technology-Enhanced_Teacher_Education_for_21st_Century_Challenges_and_Possibilities

Chávez, FAA, Sánchez, CID, De la Cruz Montoya, D., & Barboza, A.S. (2023). Understanding digital skills and their application in obtaining learning in the post-Covid-19 era: e-2309: 3(1), 1-8. *GESTIONES* . https://doi.org/10.5281/zenodo. 14018785

Cochrane, S. (2023). Urgency and Opportunity. *Preparing a Generation of Solutions* . Childhood Education, 99(1), 6-13. https://eric.ed.gov/?id=EJ1378868

Deng, N., Soh, K., Abdullah, B., Huang, D., Xiao, W., & Liu, H. (2023). Effects of plyometric training on technical skill performance among athletes: A systematic review and meta-analysis. *PLOS ONE,* 18. https://doi.org/10.1371/journal.pone.0288340

Denis, RF, & Rodríguez, AAR (2019). *General reflections on sports nutrition* . https://g-se.com/es/nutricion-y-rendimiento-deportivo-2141-sa-r57cfb27282f07

Garnett, K. A. (2024). Educators Remedying Linguicism through Critical Language Awareness and Critical Trans/multilingualism *: Towards Planetary Justice.* https://aura.antioch.edu/etds/1084/

Gilhooly, M., Cahalan, R., O'Sullivan, K., & Norton, C. (2023). A systematic literature review of injury epidemiology and surveillance practices in elite adult female field-based team sport. *Journal of Science and Medicine in Sport* . https://doi.org/10.1016/j.jsams.2023.04.010

Goldman, G.D. (2021). Engaging students in STEM through a solutionary approach. *Connected Science Learning, 3* (1), 12318675. https://www.nsta.org/connected-science-learning/connected-science-learning-january-february-2021/engaging-students-stem

Herwig, D. (2024). Creating a leadership skills course for High School students using the *Solutionary Framework.* https://www.theseus.fi/handle/10024/868652

Manobanda, MJT, & Villacís, MVG (2024). Nutritional intervention in high-performance athletes with anemia. Scientific Code *Research Journal* , 5(E3), 553–571. https://repositorio.uta.edu.ec/handle/123456789/42949

Mejía Vides, JA (2024). Internship report: Comprehensive development of archery training: strategies and methodology. *UTS Repository.* http://repositorio.uts.edu.co:8080/xmlui/handle/123456789/18493

Núñez-Naranjo, A.F., Escobar-Bermúdes, D.I., Naranjo-Vasconez, L.C., & Núñez-Naranjo, N.C. (2023). Promoting healthy eating: Incentivizing research and teaching. RICEd: *Journal of Research in Educational Sciences* , 1(1), 41–47. https://doi.org/10.53877/riced1.1-26

Qqueccaño Quispe, J., & Rodriguez Rubio, F. (2022). Nutritional knowledge, diet quality index, and antioxidant food consumption in athletes. http://www.scielo.org.pe/pdf/rfmh/v23n2/2308-0531-rfmh-23-02-38.pdf

Rodríguez-Perea, Á., Reyes-Ferrada, W., Jerez-Mayorga, D., Ríos, L., Van Den Tillar, R., Ríos, I., & Martínez-García, D. (2023). Core training and performance: a systematic review with meta-analysis. *Biology of Sport,* 40, 975–992. https://doi.org/10.5114/biolsport.2023.123319

Rojas Krugger, J.C., & Ugaz Roque, N. (2024). Strategic Planning and Organizational Management of Human Potential to Plan Sports Activities and Manage Stress. *GESTIONES*, 4(1), e-2414. https://doi.org/10.5281/zenodo.14583682

Saiz, DAG, & Díaz, Á. JG (2020). Theoretical review on the nutritional contribution and health of the vegan diet in athletes. *Digital Journal: Physical Activity and Sport* , 6(1), 129-164. https://revistas.udca.edu.co/index.php/rdafd/article/view/1435

Valladares Fuente, FE, León Quinapallo, XP, & Lima Neira, EV (2024). PPGarden, an initiative to improve nutrition in athletes. *PODIUM – Journal of Science and Technology in Physical Culture*, 9(1). https://podium.upr.edu.cu/index.php/podium/article/view/1608?articlesBySameAuthorPage=2

Villegas-Flores, VP (2023). Gender conceptions and school coexistence among students of the Cmdt. Césa Endara Peñaherrera educational unit. *RICEd: Journal of Research in Educational Sciences* , 1(1), 8-21. https://doi.org/10.53877/riced1.1-23

Wasa, C., Rahayu, T., & Setijono, H. (2024). Analysis of sports policy in Papua in the formation of the Papuan contingent at the XX National Sports Week (PON *)* . *Journal of Physical Education, Sport and Training.* https://dialnet.unirioja.es/servlet/articulo?codigo=9515716

Weil, Z. (2012). Creating a generation of solutions. Educational Horizons, 90(4), 24-27. Educational Horizons magazine website. *Link: Educational Horizons* Vol. 90, No. 4 https://zoeweil.wordpress.com/2012/04/04/creating-a-generation-of-solutionaries/?utm_source=chatgpt.com

Weil, Z. (2019). Becoming a solution: What it means and why it matters. *Psychology To available on Zoe Weil's Psychology Today blog* https://www.psychologytoday.com/us/blog/becoming-solutionary/201903/becoming-solutionary

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Danaisys Arronte Arce (25% of the work): Methodology, Formal analysis Dionisia Yamirta Alcántara Buduen (25% of the work): Software, Supervision,
Lizmary Feriz Otaño (25% of the work): Visualization, Validation

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